

The Southern Surgeon

VOLUME XVI

1950

THE SOUTHERN SURGEON PUBLISHING CO.

ATLANTA, GEORGIA

The Fulton County Medical Society
announces
THE ATLANTA GRADUATE MEDICAL ASSEMBLY
February 5, 6, 7, 1951

Municipal Auditorium Annex, Atlanta

- DR. SARA M. JORDAN, Lahey Clinic.
1. *Diagnosis of Cancer of the Stomach.*
2. *Medical Management of Peptic Ulcer.*
- DR. FRED W. RANKIN, Lexington, Ky.
1. *Modern Management of Cancer of the Colon.*
2. *Modern Trends in the Management of Rectal Cancer.*
- DR. RICHARD B. CAPPS, Northwestern University.
1. *Diagnosis and Treatment of Chronic Hepatitis.*
2. *Diagnosis and Treatment of Amebiasis and Amebic Hepatitis.*
- DR. WALTMAN WALTERS, Mayo Clinic.
1. *Cancer of the Stomach.*
2. *Surgery of the Biliary Tract.*
- DR. WARREN W. QUILLIAN, Coral Gables, Fla.
1. *Infections in the Urinary Tract of Children.*
2. *Diarrhea.*
- DR. GEORGE VAN S. SMITH, Harvard.
1. *Dysfunctional Endometrial Bleeding.*
2. *Office Gynecology.*
- DR. JOHN PARKS, George Washington University.
1. *Urinary Tract Infections in Pregnancy.*
2. *Placental Complications.*
- DR. J. S. SPEED, University of Tennessee.
1. *Minor Surgery of the Foot.*
2. *Chronic Rheumatic Arthritis.*
- DR. IRVINE H. PAGE, Cleveland Clinic.
1. *Diagnosis of Hypertension.*
2. *Treatment of Hypertension.*
- DR. JOHN R. GODWIN, Ochsner Clinic.
1. *Melanomas.*
2. *Iodine—131.*
- DR. GEORGE J. THOMAS, University of Pittsburgh.
1. *Fire and Explosive Hazards in Hospitals.*

The following speakers have not announced their topics but will talk on the general subject given:

- DR. WALTER BAUER, Harvard; Arthritis.
DR. WINCHELL McK. CRAIG, Mayo Clinic; Neurosurgery.
DR. CARLTON B. PEIRCE, McGill University; Radiology.
DR. GRAYSON L. CARROLL, St. Louis; Antibiotics.
DR. T. LEON HOWARD, Denver; Urology.
DR. JOHN R. MOTE, Chicago; ACTH.
DR. SAMUEL PROGER, Tufts Medical School; Cardiology.
DR. F. WM. SUNDERMAN, Atlanta; Clinical Pathology.

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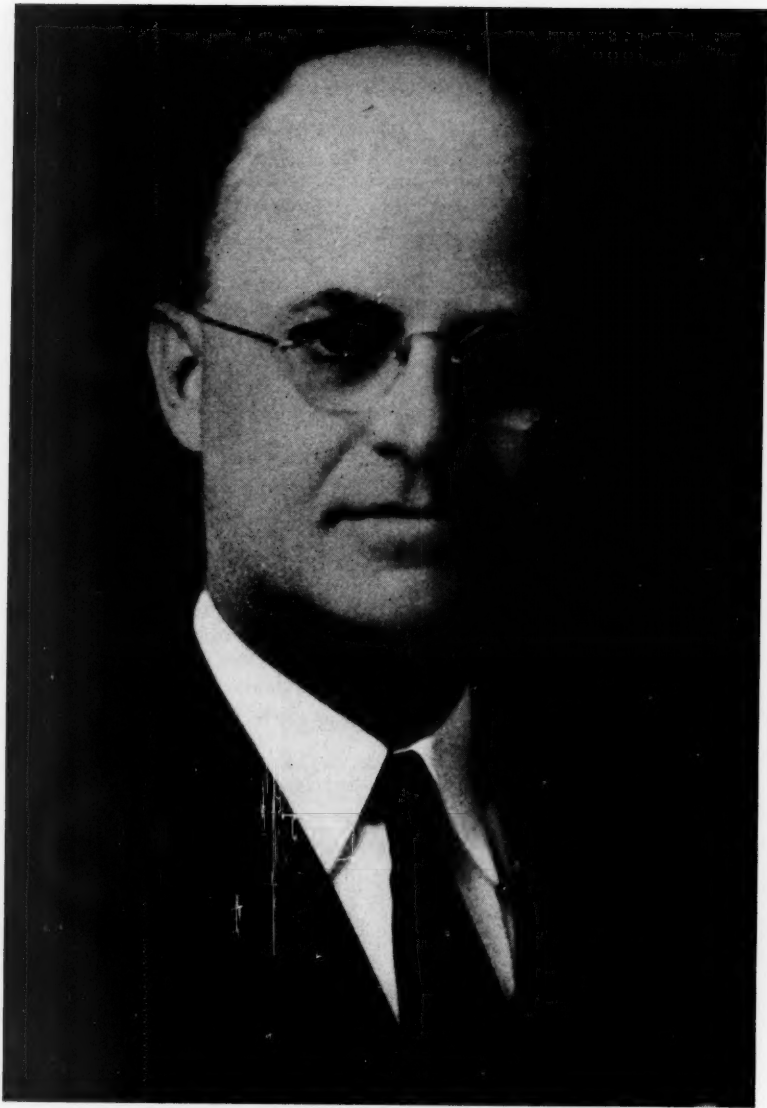
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DR. CHARLES STANLEY WHITE, Washington, D. C.
Sigmoido-vesical Fistula: Diagnosis and Treatment

DR. WILLIAM CRAWFORD WHITE, New York, N. Y.
Radical Operation of Cancer of the Breast

DR. HAYS R. YANDELL, Tulsa, Okla.
The Treatment of Extensive Burns

DR. GEORGE H. YEAGER, Baltimore, Md.
Treatment of Mixed Peritonitis with Aureomycin



R. J. WILKINSON, M.D., *President*

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January, 1950

ON TO WASHINGTON!

To the Medical and Surgical Profession:

The Southeastern Surgical Congress extends to you a most cordial invitation to attend the eighteenth annual assembly, March 6-9, 1950, at the Shoreham Hotel, Washington, D. C.

A splendid program has been prepared and I feel confident that you will enjoy listening to the distinguished speakers, as well as partaking of the hospitality that is being offered by the committee on arrangements. A visit to our nation's capital will also give you an opportunity to view the many places of historical interest.

The Southeastern Surgical Congress, representing as it does the outstanding surgeons in twelve southern states and the District of Columbia, is destined to play an important role in the advancement of medical education in the South.

I shall deem it a pleasure to greet you personally at the Washington meeting.

Yours very truly,

R. J. WILKINSON, M.D., *President*
The Southeastern Surgical Congress

A CLINICAL EVALUATION OF VAGOTOMY IN THE TREATMENT OF PEPTIC ULCER

MARTIN NORDLAND, M.D.
CLARK MARSHALL, M.D.
MARTIN A. NORDLAND, M.D.
Minneapolis

THE treatment of peptic ulcer is *primarily a medical problem*, and it should always be considered so. Yet, in a certain number of patients with peptic ulcers, surgical treatment becomes indicated because of complications related to the ulcer, or because of inability to control the patient's symptoms by medical management. In the past, a number of varied types of surgical procedures have been advocated. Gastric resection for duodenal ulcer gradually replaced gastroenterostomy which used to be the operation of choice for this condition up to twenty years ago. Although the results of gastric resection are usually good, it still carries an appreciable mortality of at least 3 to 5 per cent, and some poor functional results. It was for this reason that Dragstedt reintroduced the vagotomy operation in 1943, as a more simple means of controlling the excess acid secretion of the stomach associated with peptic ulcer. He believed that by abolishing the cephalic or psychic phase of secretion, the vagotomy operation would reduce the excess acid secretion of the stomach sufficiently to permit the healing of peptic ulcer. Since that time, the operation has been performed in hundreds of cases with apparently good results. Our knowledge of the physiologic effects of the procedure has been greatly increased both by the increased amount of investigational work, and by the many case reports of the results obtained in human beings. Yet we will have to follow these people who have had the vagotomy operation for a number of years before we can learn the true worth of the procedure. From the reports that have been published, it is becoming more and more apparent that vagotomy in the selected patient with ulcer has a decided value. The operation was never intended to be a cure-all for all patients with peptic ulcers. Much useless discussion has been indulged in because of this wrong impression. If we are to improve our results, we must improve our methods of selection of cases. It is for this reason we feel that the follow-up study of this group of patients is worth while reporting.

PRESENTATION OF MATERIAL

This series of cases, in which vagotomy is performed as a treat-

Presented before The Southwestern Surgical Congress, Houston, Texas, Sept. 27, 1949.

ment for peptic ulcer, numbers 50 in all. They are consecutive cases in private practice. While the number of cases is relatively small, they are sufficient in number from which to draw some valuable conclusions. There were 8 women and 42 men in the series. The oldest patient was 72 years old and the youngest 28 years old, with the majority in the age groups of 30 to 50 years. There were 42 cases of duodenal, 4 cases of duodenal plus gastric ulcers, and 4 cases with stomal ulcers as the result of previous gastroenterostomies. The duration of the symptoms prior to operation ranged from 40 years to 2 years, with the average duration about 13 years. There was a history of bleeding preoperatively in 21 patients; 11 could be classed as having had severe massive hemorrhages requiring transfusions; 3 patients could be classed as "painless bleeders" as suggested by Dr. F. Moore. That is, they had painless ulcers that bled occasionally. None of the patients was bleeding at the time of operation; but several had had massive hemorrhages a few weeks or months before the operation. Intractable pain with inability to control their symptoms by diet was given as a reason for coming to surgery in 47 cases. Preoperatively, all patients had x-ray evidence of active ulcer. Four cases had a history of previous perforation. There was no selection of cases other than for the above reasons. In the 41 cases operated upon for ulcer since this study, a more careful selection has been employed. We have been very careful to rule out the hopelessly neurotic or true hypochondriacal individuals.

The cases can also be divided into the type of procedure performed. There were 41 cases of transthoracic vagotomy. In 9 cases the vagotomy was performed through the abdomen. Of these abdominal vagotomy cases, 8 had gastroenterostomies performed at the same time. One of the cases of abdominal vagotomy had an excision of a gastric ulcer at the same time. Of the patients who had transthoracic vagotomies, four had previously had gastroenterostomies. Five patients who had transthoracic vagotomies subsequently required gastroenterostomies for the relief of retention.

The choice of operation was decided in the following manner: Early in the series only those cases with duodenal ulcer and no history of retention, and whose x-rays showed the stomach to empty in less than four hours, had transthoracic vagotomies. Because five of the earlier cases developed retention and needed subsequent gastroenterostomies, this emptying time was later shortened to two hours. We preferred the thoracic route as a general rule. The abdominal route was chosen for those patients in whom a gastroenterostomy was necessary, because of symptoms of reten-

tion. The abdominal route was also chosen in those cases with both duodenal and gastric ulcers, in order to examine the gastric ulcer and excise it if it was quite large. There was only one such case in which a large gastric ulcer was excised.

Postoperatively, in the earlier cases, the patients were kept on gastric suction for 3 to 4 days, with a slow return to normal diet over a period of three weeks to a month. The later patients were warned not to eat much for several months. The more careful supervision was rewarded in preventing retention, since in later cases we seemed to have less trouble.

There were no operative deaths in the series. The only immediate complication was the development of a massive pleural effusion in one case whose history revealed that he had had a pleural effusion on that side of his chest during an attack of pneumonia.

FOLLOW-UP STUDY

The plan carried out in the follow-up study of these cases was as follows. Each patient was personally interviewed and one or more complete x-ray studies of the stomach was made. We found that interviewing patients without a follow-up x-ray study would have been very misleading. Several patients clinically were well. On examination of their x-rays, there was evidence of small gastric ulcerations. Only those patients who showed evidence of recurrence of ulcer or still complained of ulcer symptoms were subjected to the insulin test. Patients with a gastroenterostomy who showed recurrent gastric ulceration were not given the insulin test. After attempting to test in two such patients, it was seen that the reflux of material from the jejunum rapidly neutralized the gastric acidity and invalidated the test. It was felt that such a follow-up was entirely *adequate* to enable one *clinically* to evaluate the work of the operation. The average length of time from operation to follow-up was 16 months. The shortest was 8 months, and the longest 35 months.

CLASSIFICATION OF RESULTS

In order to gain a picture of the over-all results in this series, we have evaluated the individual results in each case and then placed them in one of three groups. The *first group* contains only those cases which could be classed as having an "excellent" result. Only those patients who have returned to a *completely normal existence* are included. These patients are now entirely free of pain and show no evidence of bleeding. They are able to eat without reservation. They now can work without interruption and they show no dis-

trressing side effects that are associated with vagotomy. The x-ray studies of the patients in this group show no evidence of active ulcer; and the stomach functions normally. In other words, they are well as far as can be determined.

In the *second group* are patients who are classified as a "fair" result. In this group are included the patients who have some of the minor distressing symptoms associated with vagotomy. They feel much better, and are pleased with the result of the operation. These patients also have healed lesions as evidenced by x-ray studies. Also included in this group are patients who could have been classified clinically as "excellent" results; yet, on x-ray examination, they show evidence of small asymptomatic gastric ulcerations or erosions, which appear to be quite shallow. Also, one patient is included who has an excellent clinical result with no x-ray evidence of recurrence of his ulcer; but who occasionally shows some blood in his stools. We feel it would be wrong to classify these patients as "poor" results, since they are so much improved over their pre-operative condition, and are fairly well pleased with the result. These cases will be discussed individually later.

TABLE I

Summary of Results at an Average of 16 Months Postoperatively

Procedure	Excellent		Fair		Poor	
	Cases	Per Cent	Cases	Per Cent	Cases	Percent
Transthoracic vagotomy alone	27	54	2	4	3	6
Transthoracic with previous gastroenterostomy	1	2	3	6		
Transabdominal with gastroenterostomy	7	14	1	2		
Transabdominal with excision of ulcer			1	2		
Transthoracic followed by gastroenterostomy	2	4	1	2	2	4
Totals	37	74	8	16	5	10

In the *third group* are placed those patients who have a "poor" result. These few patients have x-ray evidence of recurrence of their ulcer with all the symptoms of pain, etc.; or they still have their typical ulcer pain without x-ray evidence of recurrence of the ulcer. They feel they have derived no benefit from the operation. Included also are some patients in whom the side effects of the vagotomy are so distressing that they feel worse than before.

After evaluating each case, with personal interests and postopera-

tive examinations, the following classification was made. There were 37 patients who were classified as "excellent" results, or 74 per cent. There were 8 "fair" results, or 16 per cent; and 5 "poor" results, or 10 per cent. A further breakdown of these cases is seen in the following table:

DISCUSSION OF RESULTS

Very little discussion of the cases with "excellent" results is necessary. Some comments should however be made about them. The change in the condition of these patients was quite dramatic and almost unbelievable in some. It was most gratifying to hear a patient tell how good he felt and how much he could eat, when, for 20 years before, he had struggled along, a veritable ulcer cripple. One can only hope that such a result will be permanent. So far, there is no reason to feel that such will not be the case. The average weight gain was 12 pounds in this group with "excellent" results. There was no loss of weight except in two patients who had been markedly overweight, due to drinking milk in large amounts pre-operatively.

The cases with "fair" and "poor" results should be discussed separately. A more careful selection in the future will help to avoid such poor results. Three of these patients are grouped together because they are all very much alike. They are clinically improved; yet on x-ray examination, small gastric ulcers or erosions were seen.

CASE HISTORIES

G. F., a 44 year old male (typical of all three), had a transthoracic vagotomy in July, 1946, after a 20 year history of severe epigastric pain, related to a duodenal ulcer. He had had one episode of perforation in 1938; and in 1940 a gastroenterostomy had been performed because of gastric retention. His main complaint at the time of the vagotomy was pain from an active duodenal ulcer and a questionable stomal ulcer. The patient had dramatic relief from pain and distress following the vagotomy but in March, 1948, a small gastric erosion was demonstrated by x-ray on the lesser curvature of the stomach. This ulcer healed in about two months after treatment mainly with a bland diet. This patient has gained 20 pounds since his operation, and was well pleased with his result. A gastric analysis showed no free acid, probably due to the presence of the gastroenterostomy. Insulin gastric test was not performed. X-ray study in February, 1949, showed no evidence of a gastric ulcer or a duodenal ulcer. A more recent x-ray study reveals that the patient has graduated into the "excellent" class.

A discussion of these cases of recurrent asymptomatic gastric ulcers and bleeding following vagotomy is of interest, since other people have made similar observations. Dragstedt reports one such case. L. M. Asher, reporting on the gastrosopic findings after vagotomy, mentions 6 cases of gastritis with gastric erosions follow-

ing vagotomy alone, and 3 cases in patients whose vagotomy was combined with gastroenterostomy. However, he does not mention whether gastric insulin tests were made to determine the completeness of the vagotomy. Nevertheless, there was definitely a change from the preoperative condition of the gastric mucosa. Asher cites the work of other investigators, and concludes that there are probably three factors which may contribute to the production of the gastritis with gastric erosions he observed after vagotomy. First of all, there is left an unopposed vasoconstrictor state that produces in the wall of the stomach a condition of relative circulatory insufficiency, which renders the mucosa more susceptible to trauma. Secondly, he feels that the lowered mucin production found after vagotomy again offers less protection to the gastric mucosa. Thirdly, the delayed emptying time of the stomach prolongs the physical trauma caused by food in the stomach. It may be that these factors which contribute to the production of gastritis and gastric erosions postoperatively are merely transitory like other side effects seen following vagotomy. And so, with proper care, they can be controlled until the stomach returns to a more normal physiologic state. However, in one of our cases that developed a gastritis and gastric erosion, a positive insulin gastric test was found, indicating there was still some vagal or parasympathetic stimuli reaching the stomach. It is possible then, that the cephalic phase of secretion was still partially present and therefore capable of producing a gastritis with ulcerations in the mucosa of a partially denervated and therefore functionally impaired stomach. Perhaps if these patients were subjected to another operation in an attempt to divide more vagus fibers possibly overlooked at the first operation, a better result might be obtained. The possibility that this is the first manifestation of an atrophic gastritis was also mentioned by Asher. This may be the group on whom we cannot expect vagotomy to produce a complete cure, as suggested by F. D. Moore. They may be considered as that group in which the vagotomy operation has made their ulcer symptoms easier to control, and they will be forced to follow a liberal bland diet in order to remain well.

The four other patients who were classified as only "fair" results have shown no evidence of recurrence of ulcer or bleeding; but they have other complaints which perhaps are related to the operation, and which cause distress and make them feel they have not had a good result.

A. G., aged 52, housewife (typical of this group), had a 14 year history of severe ulcer pain from both a duodenal and a large gastric ulcer. Abdominal vagotomy combined with excision of the gastric ulcer was performed in December, 1946. She had complete relief of pain, and x-rays showed healing of

the duodenal ulcer. She had gained about 20 pounds in weight following the procedure. But at the time of follow-up study in May, 1948, she had multiple complaints of nausea, abdominal distention, and excess colonic gas, but no recurrence of her ulcer pain. Gastrointestinal studies were normal except for slight gastric retention at four hours. Colon studies were normal. This woman is somewhat hard to evaluate since there may be a large functional factor in her complaints. She eats a completely vegetarian diet, even though advised that she could be more liberal in her choice of food, so there appears to be a large factor of hypochondriasis in her clinical picture. A more careful selection of cases would eliminate this type.

From the case histories of these patients, we can conclude that two are definitely neurotic individuals, and further improvement cannot be expected. The other two, perhaps, are still having the side effects of vagotomy which affect the colon, and further improvement may be looked for. In all four, the major complaint was improved by the operation.

There are five cases classified as "poor" results. Only two of these cases showed x-ray evidence of recurrence of their original lesion. One other patient had recurrence of ulcer pain with bleeding, and the remaining two had symptoms relating to their vagotomy that are distressing enough to make us feel the result was poor. A review of the cases follows:

L. F., male, aged 32, salesman, gave a history of severe, constant, intractable pain for over two years from a duodenal ulcer. Dietary management was entirely unsuccessful. The patient had a transthoracic vagotomy in December, 1947. Following the vagotomy, he developed persistent gastric retention, and did not have relief of his ulcer pain. A gastroenterostomy was performed in May, 1948. X-rays of his stomach at that time showed 70 per cent retention, but no evidence of an ulcer crater in the duodenum was seen. Since the time of his gastroenterostomy, he has had typical ulcer pain and tenderness, plus a generalized burning soreness in his epigastrium, which is related to the gastroenterostomy. He had gained only 5 pounds in weight and was not pleased with the result. X-rays in April, 1949, showed the gastroenterostomy to be functioning well, but there is an active duodenal ulcer demonstrable. It was felt that he had an incomplete vagotomy, although no insulin gastric test was performed because of the gastroenterostomy. He consented to a re-exploration in an effort to secure a more complete vagotomy, and this was performed in April, 1949. A large intact posterior branch of the vagus nerve was found. This patient has made a spectacular recovery and is now without symptoms and without ulcer. Undoubtedly, many "poor" results have been due to incomplete vagotomy.

A. K., a 59 year old housewife, had a 20 year history of duodenal ulcer with typical ulcer pain and distress. Along with the ulcer history she had multiple other complaints of pain in the back, weakness, "spastic colon," etc. A thoracic vagotomy was performed in December, 1947.

From individual examination of the "poor" results, we felt that three were undoubtedly the result of incomplete vagotomies. Of

the remaining two, one, a nervous liquor salesman who was in the process of getting a divorce, was considered "poor" because of the side effects of the operation. The other "poor" result is a female who insists she is not well in spite of x-ray evidence that the ulcer no longer exists.

PHYSIOLOGIC EFFECTS OF VAGOTOMY ON PATIENTS WITH PEPTIC ULCER

Much has been written about the physiologic effects of vagotomy and their causes. A brief application of these effects in this series of patients is interesting.

1. *Disappearance of Pain*

Out of the 47 patients who had pain preoperatively, 44 or 94 per cent were relieved of the pain by the operation. This is the most gratifying result of the operation as far as the patient is concerned, as well as the best indication that the operation was a success. The three patients who were not relieved of pain revealed after further investigation that the vagotomy was incomplete. There is no doubt that pain in peptic ulcer is due to hyperacidity and hypergastric motility. Therefore, the mechanism by which the vagotomy operation relieves the pain becomes clear. Without this relief, the vagotomy must be considered incomplete.

2. *Diarrhea*

Diarrhea following vagotomy has frequently been reported. In this series 26 patients, or 52 per cent, developed a diarrhea postoperatively. In 9 patients (18 per cent) it was of sufficient duration and severity to cause the patient discomfort and inconvenience in carrying out his daily work. The average onset of the diarrhea was about one week to one month following vagotomy. The average duration was 2 to 3 months. The longest it persisted in any one case was 9 months. Since the usual story was that the diarrhea improved as the interval from the operation increased, most of the patients were easily reassured and were not inclined to complain about it. The diarrhea, when present, was difficult to control. No satisfactory explanation has been given as the cause of this complication. It is interesting that constipation is no longer a problem with most of the patients. Indeed, many remarked that relief of constipation is one of the more gratifying results of the procedure. We feel that, with only 18 to 20 per cent of patients affected, diarrhea is not a serious problem, since all patients improve with time.

3. *Gastric Retention*

Only five cases out of 37, or 13 per cent, who had had thoracic vagotomy alone, developed gastric retention of a degree severe

enough and persistent enough to necessitate a secondary gastroenterostomy. This corresponds to a figure of 12 per cent reported by other groups. This number possibly could have been reduced with more careful preoperative selection, more careful postoperative feeding and more vigorous therapy. By x-ray examination, only 7 out of 37 cases, or about 19 per cent of the thoracic vagotomies, showed any retention at four hours at the time of follow-up, and this was asymptomatic. Decreased tonus, diminished persistalsis, scarring of the duodenum secondary to the healing of the ulcer, as well as pylorospasm, must be considered factors in the cause of retention.

An accurate method for the choice of patients so as to prevent gastric retention has not been satisfactorily developed. The patient should be evaluated preoperatively. If it is felt that serious retention will develop following a vagotomy, we would advocate a gastric resection for such patients, rather than a vagotomy combined with gastroenterostomy. We are not yet convinced that the combined operation is a good procedure.

4. *Belching*

Belching, epigastric fullness and excess gas were encountered as postoperative symptoms in 32 cases, or 64 per cent of the patients. In only three cases was there a complaint of belching foul-smelling gas. In these three cases, it did not persist over six months postoperatively. In 9 patients, or 18 per cent, the belching and fullness were severe enough to cause them to remark about it. The remainder of the patients merely admitted that they had such symptoms, but they were not distressing.

5. *Cardiospasm*

Cardiospasm, or symptoms of esophageal obstruction, was found to be present in 5 cases, or 10 per cent. In 2 patients there was a history of complete obstruction of the lower esophagus following the ingestion of food, and lasting for more than one day. In one patient a piece of meat became lodged in the lower esophagus for two days, and required chemical dissolution before further food could be taken. The other spontaneously relented. In three cases the symptoms of cardiospasm were still present at the time of follow-up. We feel that it is a true cardiospasm, since the patients state that if they drink some warm water in the morning before attempting to eat, they seemed to have no further trouble. Still this would not rule out some peristaltic dysfunction of the lower esophagus. Ritvo and Shauffer showed that there was x-ray evidence of true cardiospasm. Machella and Lorber also reported a case of esophageal obstruction following vagotomy. In none of the

patients in our series was the cardiospasm of any distressing magnitude.

Most of the physiologic side effects of vagotomy for peptic ulcer, while distressing, gradually diminish in severity and are forgotten by the patient.

PSYCHOSOMATIC ASPECTS

The patients in this series were all closely questioned concerning any improvement in their nervous symptoms. Approximately 37 patients, or 74 per cent, said they were definitely improved, and about half of these said that they were markedly improved. That is, they were calmer, easier to get along with. They could work harder, and they could face their daily problems without causing some reaction in their stomach. One patient said he now could talk with his boss without feeling afraid, something he had been unable to do for fifteen years. Another patient, a labor organizer, said he now could bargain the most difficult labor contracts with no effect on his stomach. "It was as if my stomach was now cut off from my head," he stated. About 13 cases showed no improvement, or else an increase in their nervous symptoms. As would be expected, they were in the groups of patients classed as only "fair" or "poor" results, and thus had no reason to show improvement regarding their nervous symptoms.

The patient who said his stomach was now cut off from his head really describes what is felt to be the most important reason for the improvement the vagotomy operation gives. We cannot deny, therefore, that one of the reasons that vagotomy causes healing of peptic ulcers is that it destroys the relationship between emotional stimuli and changes in the gastric mucosa.

CONCLUSIONS

From this study and other studies reported in the literature, we gain the impression that the results of vagotomy alone performed for peptic ulcer in the selected cases are generally quite good. We agree that it may yet be too early for a good evaluation. A composite study of reports by F. D. Moore, Collins, and Stevenson, and Smith, Ruffin and Baylin, shows that excellent results are obtained in about 75 to 85 per cent of cases, and satisfactory results in about 90 per cent of cases. Recurrence rates vary from 4 to 6 per cent, with unsatisfactory results usually totalling about 10 per cent. The overall results in our series of cases closely parallels the above figures. Perhaps our results are slightly poorer. With an improved technic and more careful selection of patients, we seem to be getting better results in the 41 cases operated upon since this

study was undertaken. We believe that vagotomy alone will control the symptoms and cause healing of peptic ulcers in about 90 per cent of cases.

We have found that vagotomy is best for patients in the better economic level of society whose presenting problem is either incapacitating pain or repeated hemorrhage. The more definite and clear-cut the picture is, the more satisfactory the result will be. The neurotic patient with an ulcer is not a good candidate. We do not feel that the younger patients do any better than those in the middle age group. We feel that the bad results in vagotomy do not outnumber the ill effects of gastrectomy. We feel that ulcers of the stomach should be dealt with by at least 75 per cent gastrectomy. On the whole, we feel that vagotomy has a place in the treatment of duodenal ulcer in the properly selected case. We believe that the transthoracic approach is by far the better method because no matter how skillful a surgeon is, we do not believe he can be sure that he has bisected the vagus nerves and branches completely. Incomplete vagotomy naturally accounts for recurrent ulcer and an unsatisfactory result. We feel that the procedure is still on trial and we intend to follow the group of patients for a considerable length of time to evaluate more thoroughly the operation.

It was concluded from this study that vagotomy is indicated in the treatment of patients with marginal ulcers, patients with intractable duodenal ulcers in whom the ulcer pattern is quite clear cut, and patients with duodenal ulcers who have a history of repeated hemorrhages. Vagotomy alone is preferable to vagotomy combined with a drainage operation.

MULTIPLE PRIMARY MALIGNANT TUMORS

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MULTIPLICITY of malignant tumors is being recognized with increasing frequency since first reported by Billroth¹ in 1860. Warren and Gates² reported an incidence of 3.7 per cent in their series of 1,078 cancer autopsies. Other authors do not find such high percentages. Billroth laid down the following criteria for multiple primary malignancies: (1) Each tumor must have an independent histologic appearance. (2) The tumors must arise in different locations. (3) Each tumor must produce its own metastases. Goetze³ added the following additional criteria: (1) The macroscopic and microscopic appearance of the tumors must be that of the usual carcinoma of the organs involved. (2) Exclusion of metastasis must be certain. (3) The diagnosis must be confirmed by the character of the metastasis in each case. Holland⁴ reported, with apparent cure, a case with the following malignancies: (1) Adenocarcinoma of the breast. (2) Squamous cell carcinoma of the esophagus. (3) Basal cell carcinoma of the cheek, and (4) Adenocarcinoma of the colon. Hayward⁵ reported the case of an 82 year old man who was treated for the following: Basal cell carcinomas, epidermoid carcinoma, adenocarcinoma of the prostate and embryonal carcinoma of the testis. Leyden⁶ reported carcinomata of uterus, cervix, both breasts, stomach and skin of the back. Luchsinger⁷ reported a case with carcinomata of the forehead and bronchus, hypernephroma of the kidney and osteochondroma of the lung. There are a larger number of reports of double and triple malignancies.

We are presenting the following case because of the number of primary malignancies (seven) and because of the organ systems involved (three).

Mrs. K. P., white female, aged 59, weight 250 pounds, was first seen in May, 1946, because of a lump in the left breast. Frozen section revealed adenocarcinoma—grade II—and a left radical mastectomy (H.C.F.) was performed on May 31. Postoperative course was uneventful and she received a full course of x-ray therapy. On Oct. 4, 1946, she was seen because of vaginal bleeding of 2 days' duration. Her last menstrual period had been in 1935. Papanicolaou stains revealed malignant cells. Pelvic examination was negative. Dilatation and curettement and a cervical biopsy were refused. When seen again on Feb. 21, 1947, she stated that she had had a slight vaginal discharge daily since the last visit in October, 1946, and had begun to bleed again

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on February 20. Repeat cytology studies continued to reveal malignant cells. On March 3, 1947, dilatation and curettement were performed (H.C.F.). This showed small fragments of atrophic endometrium. Biopsy of cervix (H.C.F.) on April 4 failed to reveal any evidence of new growth.

Exploratory laparotomy (H.C.F.) was performed on May 20, 1947.

At operation the patient was found to have adenocarcinoma of each ovary extending into each tube. Bilateral salpingo-oophorectomy, total hysterectomy and appendectomy were performed. The pathologic report grossly reveals the left ovary to be largely replaced by a cyst, the size of a lemon, in which there is a soft papillary growth some of which appears on the outside of the cyst wall. The right ovary is a large mass, the size of a grapefruit, with denuded, papillary projections over the surface. On gross section there is a large, partly macerated growth 8 cm. in diameter, replacing the ovary, from which two blocks are taken, together with a block from the outside projection for paraffin sections. Most of the growth is very soft and macerated. Microscopic sections show much the same histology for the three blocks, a cellular growth, made up of pale anaplastic cells, some of which have a marked tendency to alveolar arrangement.

Diagnosis: Adenocarcinoma of ovaries: The cells of this growth are radio-sensitive and deep therapy should be tried.

Six weeks postoperatively the patient was given 3,000 r in air through eight abdominal portals and this was repeated six weeks later. X-ray examination of the lumbosacral vertebrae and pelvis, on Oct. 2, 1947, revealed no evidence of osseous metastasis.

In November, 1947, the patient began having attacks of biliary colic. X-ray examination on Jan. 2, 1948, showed calculi. On February 7, cholecystectomy was performed (R.G.B.). Abdominal exploration at this time showed that the abdomen was free of any implants from the ovarian carcinomata. The common bile duct was not distended. The head of the pancreas felt a little firm and enlarged but it was not nodular and was not considered of any particular significance. The postoperative course was uneventful until the tenth postoperative day when she had a chill. Blood and pus cells were found in the urine. She responded well to urinary antiseptics but continued to complain of bilateral costovertebral tenderness. Four and one half weeks postoperatively, she began having hematuria again and at this examination bile was first detected in the urine. On March 9 the icteric index was 21.2 and the van den Bergh was positive direct. Despite supportive treatment her condition grew steadily weaker and she died on March 12 in cardiac failure. A postmortem examination was performed and the following is the pathologic report of pieces of tissue submitted for examination.

PANCREAS

Gross: A roughly ovoid mass of pancreatic tissue measuring 7 by 4 cm. Consistency is markedly increased. On the periphery there are several spheric masses of homogeneous, soft, white tissue up to 0.3 in diameter. A section of duodenum 7 cm. long is attached. The pancreatic duct throughout its entire length is dilated and its lumen is lined by a layer of soft, white tissue up to 0.3 cm. thick.

Microscopic: There is pronounced increase in and active proliferation of both intralobular and interlobular fibrous connective tissue. Much of the pancreatic tissue is preserved but there is tumor tissue in almost every field.

Most of this is composed of cells moderate in size which are loosely arranged in groups and strands. They have a small amount of cytoplasm and large, hyperchromatic nuclei with inconspicuous nucleoli. The appearance of the cells and the grouping arrangement is very similar to that seen in the islets of Langerhans. In other areas the tumor cells form glandlike structures and resemble acinar epithelium. The pancreatic duct is lined partly by preexisting epithelium and partly by tumor tissue. Here the cells are very irregular in size and shape, occurring in sheets and narrow strands with a large amount of fibrous stroma separating them. Many of the cells have extremely large giant nuclei and a very large amount of eosinophilic cytoplasm. This type of tumor tissue extends into the adjacent pancreatic tissue for a considerable distance. Many of the blood and lymphatic vessels are filled with tumor emboli. Several small blood vessels contain old organized thrombi in which there are occasional degenerated and unidentifiable cells. The tumor invades the outer wall of the attached duodenum and throughout the rest of the duodenal walls the lymphatics are permeated with tumor tissue.

LIVER

Gross: A large section of jaundiced liver whose consistency is increased.

Microscopic: There is pronounced increase in the periportal connective tissue which is infiltrated by moderate numbers of round cells. There is very slight bile duct proliferation. In these areas there are numerous small collections of tumor tissue. In some areas this is composed of very large cells which lie in a large amount of fibrous stroma and resemble the tissue lining the pancreatic duct. In other areas they resemble the tumor cells thought to have as their origin the cells of the islands of Langerhans. The central lobular sinusoids are dilated and the liver cells here are atrophic. The liver cells generally have a cloudy cytoplasm. The central lobular cells are bile stained and a few contain large fatty vacuoles.

KIDNEY

Gross: A large detached section of kidney tissue, the cortex and medulla are proportionate and the cortical surface is smooth. All of the pelvic surface which is 1 cm. in diameter is lined by a sheet of white soft tissue 0.3 cm. thick.

Microscopic: There is considerable cloudy swelling of the convoluted tubular epithelium. Many of the tubules contain bile casts. The pelvic portion is covered by a thick layer of tumor tissue which has a papillary arrangement being supported by a very small amount of fibrous connective tissue. The tumor cells on the surface are cuboidal and resemble pelvic epithelium. They become irregular in size and shape in the deeper portions and infiltrate the peripelvic tissue. In some areas the cells are very large and have a deeply eosinophilic cytoplasm, resembling the cells of stratified squamous epithelium. Fairly numerous tumor giant cells. Numerous mitotic figures. Many of the lymphatics in the kidney proper are filled with tumor tissue. A large peripelvic vein contains a partly organized thrombus.

Diagnosis:

1. Carcinoma of pancreas arising from ductal, acinar and islet epithelium.
2. Metastasis to the liver.
3. Cirrhosis, obstructive biliary, of liver.
4. Carcinoma of pelvis of kidney, papillary, primary.

DISCUSSION

The pathologists, Dr. E. S. Cardwell, Jr., of Augusta, Ga., and Dr. E. R. Pund of the Department of Pathology of the University of Georgia School of Medicine, added the following comment: As you will note from the enclosed report she had an extensive tumor of the head of the pancreas. This was in the form of multiple small lesions and gave the appearance of multiple primary tumors arising in many different areas. The morphology was entirely different in different areas, and we felt that the tumors were arising from all of the three types of epithelium in the pancreas-ductal, digestive-glandular and islet tissue. Apparently the tumor had produced an obstruction of the common bile duct and this had resulted in an obstructive biliary cirrhosis of the liver. The tumor of the kidney seemed to be primary there and entirely unrelated to the pancreatic tumors. The multiplicity of the malignancies is particularly interesting in view of the history of previous removal of malignancies of the breast and ovaries. The appearance of the tumors at autopsy was such that we feel that they are primary in their locations and it is extremely unlikely that any of them represent metastases from the previously removed tumors. This view is strengthened by the fact that the pancreas is one of the least common sites of secondary tumors. The distribution of the kidney tumor is also not that of a secondary lesion. Of course all this suggests that there must have been some widely acting carcinogenic influence in this patient.

SUMMARY

A case of seven primary malignancies in three different organ systems is presented. This case suggests the possibility of a widely acting carcinogenic influence affecting gradually one organ system after another until death ensued.

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CARCINOMA OF THE COLON

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IN the abundant literature of cancer, current discussions of carcinoma of the colon are of certain interest. The history, etiology and manifestations of this disease still merit study, while our encouraging results present a comparatively cheerful outlook, and for our *early* cases good hope of cure.

The work of Jean Francois Reybard (1795-1863) marks the "point of departure" in the record of modern colon surgery. In May, 1833, at Leon, France, Reybard performed the first recorded resection for cancer of the colon using immediate anastomosis. His patient recovered and lived for one year after operation. Ten years later, on July 30, 1843, Reybard's historic case was reported before the Academy of Medicine of France. His original article is entitled, "Report of a Malignant Tumor of the Colon; Resection of the Tumor and of the Intestine; Direct and Immediate Anastomosis of the Two Ends of the Organ. Recovery."

Reybard's successful work on the colon, already a subject of mild controversy, opened the way for his European successors, Billroth, John Marshall, Czerny, and von Volkman. It was Billroth's more famous pupil, Johann van Mikulicz-Radecki of Poland who in 1892 devised and convincingly advocated another type of procedure for the resection of cancer of the colon. This was his delayed-anastomosis operation, now modified and known as the "Bloch-Paul-Mikulicz" procedure. It is still practiced by a majority of those doing colon surgery. The pendulum swings, however; today the pioneer work of Reybard is of growing stature, the reports of Stone, Collier, Rankin, et al, bear out the value and practicability of that bold Frenchman's early contribution. From comparative records of operability and surgical results, we find that it is the improved immediate end-to-end anastomosis technic and not the classic "modified Mikulicz" by which advancement in this field of surgery proceeds.

The origin of carcinoma of the colon is still obscure. Collier, David and others state strongly that such cancers originate either in a preexisting polyp or as a sessile indurated nodule in the mucosa. The importance of the removal of polyps hence cannot be over-emphasized. They must be treated as premalignant lesions, taking

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literally the sound advice of Chauliac, "father of French surgery," who, in 1350, "believed in cutting out cancer with a knife at an early stage." Further evidence against polyps is currently given by Swinton. He recalls our attention to the fact that the incidence of early malignant change in those polyps found above the reach of the 10 inch sigmoidoscope is many times greater than in those found below this level. The familial tendency to polyps as a precancerous condition is also noteworthy. This is recorded in two striking reports on Michigan's so-called "Cancer Family of Warthin." First reported in 1913, this family consisting of 305 persons, by 1936 had had 43 primary carcinomas in 41 of its members. Twenty-six of the Warthin cancers occurred in the intestinal tract; the majority of these were located in the large bowel. Estes' report before the Southern Surgical Association in 1947 ably emphasizes this familial tendency to carcinoma.

Whatever the etiology, it is heartening to realize that in *early* malignant lesions of the colon radical removal is followed today by good results. If such results are to improve consistently, constant effort must be directed toward educating the laity in the early symptoms of cancer of the colon. This can be done through the referring physician. Our general practitioners must be taught the urgency of complete examinations in all suspicious cases, and how to make such examinations. Proctoscopic, sigmoidoscopic and barium enema tests must be included. Above all, our medical men must learn to evaluate and interpret the indefinite symptoms which these patients—if seen early enough—usually present. We too, the surgeons, must interpret more intelligently the slight symptoms, often vaguely given, in such cases. We all know that pain with unexplained abdominal discomfort, alteration in bowel habits, blood in the stool, bleeding from the rectum and anemia, are evidence of a new growth in the colon. Our chief problem is how to get such a patient to report the slightest of these highly significant symptoms. Particularly, the presence of a recurring unexplained abdominal pain is important in gaining an accurate history. Yet this is often passed over, while it is still *early*, in the patient's apparently mild complaint.

To illustrate: One of our most notable cases was a rugged, highly intelligent man, aged 76, a lawyer and bachelor, who 6 months before he came to the hospital felt an unusual discomfort in his right iliac fossa. He had always been constipated and took frequent purgatives. This time, again, he got thorough relief of his pain and constipation by purgatives, and had no further symptoms for 6 months. When I saw him in consultation during his second attack of pain, the x-ray showed a defect in the right colon which proved to be a large carcinoma. He thought he had had a mild attack of

appendicitis or simply a more marked constipation than usual, due to a stretch of very difficult and confining work in his practice. A complete examination by his physician 6 months previously would have given this patient the immense advantage of an early diagnosis and prompt operation. Fortunately, he made an uneventful recovery, and has been well for the past 16 months.

Once diagnosed, meticulous preoperative preparation is essential in all cases of carcinoma of the colon. The operation for this disease is a major and urgent procedure, but it is rarely an "emergency." Two preoperative requirements are imperative for successful surgery of the colon. First: radical operative procedure should be delayed until the patient's general condition has reached its maximum point. If anemia exists, transfusions must be given until a normal blood picture is maintained. Other abnormalities of blood chemistry can usually be corrected by dietary measures. If obstruction exists to any degree, the patient can be fed intravenously.

A thoroughly decompressed bowel is the second prerequisite for surgical success in this field. If obstruction exists to any degree, the bowel must be completely decompressed. For incomplete obstruction, a liquid diet, mild cathartics and enemas may accomplish this result. In cases of more advanced occlusion of the bowel, decompression must be obtained either by the Miller-Abbott tube or, when necessary for complete obstruction, by a temporary cecostomy or colostomy. The tube will not relieve a total obstruction of the colon; but for lesions of the *right* colon, decompression usually follows the proper use of this valuable tool. If, however, the ileocecal valve is incompetent, vomiting will result. In such cases, and when necessary for carcinoma of the *left* side a temporary cecostomy or transverse colostomy is performed. We are convinced that the radical resection of carcinoma of the colon cannot be carried out in the presence of a distended or edematous bowel. We believe, in fact, that the "leakage" occasionally reported as following a primary intestinal anastomosis, if not the result of faulty technic, is due to some such effort to suture a distended and edematous bowel.

On admission to the hospital our colon patients are placed on a low residue diet. Mineral oil and a mild saline cathartic are given daily. Sulfonamides and other antibiotics to decrease the bacterial flora of the intestinal tract are begun 6 or 7 days before operation. To eliminate all non-digested residue, the diet is changed to liquids about 3 days before operation. A thorough cleansing enema is given the morning of operation and just prior to operation the bladder is emptied by catheter. We do not advocate the local use of sulfonamides, either intraperitoneally or extraperitoneally.

General anesthesia is given these patients by an experienced anesthetist. Intravenous fluids are started when the patient reaches the operating table, with blood substituted as needed. All of our patients now receive blood during the course of operation for carcinoma of the colon.

The surgical procedure for this lesion still varies with the individual surgeon. It is usually selected and carried out according to each operator's training and ability, his choice being governed by his own proved results. I think it therefore a mistake to claim for any procedure complete superiority over all others. The criterion is rather one's ability to do the operation of his choice expertly, and to accomplish it with meticulous care. Since 1940 we have been doing the one stage end to end immediate anastomosis for lesions of both the right and left colon in the large majority of our cases. We are disciples, if remotely, of Reybard.

We realize of course that the anatomy and physiology of the two sides of this organ are different. We know that the right colon develops from the midgut and its blood supply is from the superior mesenteric artery. The left colon is developed from the hindgut, with its blood supply from the inferior mesenteric artery. Arguments have been presented to prove that the two sides should not be treated alike surgically. But our operative results with the same procedure have been equally good for both sides. In no case in our series has it been necessary to do an end to side anastomosis. We are also aware of stated objections to the end to end anastomosis, such as the discrepancies in size between the colon and ileum; but in our experience these factors have been negligible. Some critics will still doubtless complain that we have used up a lot of good luck. But, again, this objection may be more theoretic than practical. Without claiming superiority for our particular choice of procedure, we have found, and our experience has proved it to our satisfaction, that if the preparation of the patient has been properly carried out, relieving completely all distention and edema of the colon, the end to end anastomosis can be done with safety and success in all operable cases. Here again we must emphasize the supreme importance of the thorough preparation of these patients.

There are a number of good clamps to be used successfully for the anastomosis of the colon. Here, too, selection simply depends on the surgeon's personal ability and experience. Since 1938 we have used the Stone clamp and think highly of it. Other clamps may be as good, but for its smaller size, lightness and adaptability, we have found this one invaluable, and have learned to use it to advantage. By making full use of such a tool, we find no excuse for

"leakage" in surgery of the colon. After the clamps are applied, the gut is excised with an electric knife and the borders are thoroughly coagulated. This renders the field of operation relatively aseptic. Sutures are then put in, the clamps are removed, and in our series we have never had a "leak."

Following the operation for carcinoma of the colon, our patients are allowed nothing by mouth for the first 48 hours, then water only for 24 hours, then clear liquids. The diet is gradually increased until, usually by the sixth postoperative day, a soft diet is taken. Fluid and protein balance are maintained intravenously. Blood transfusions are given as indicated. If any distention occurs a Miller-Abbott tube is passed. Enemas are avoided as definitely contraindicated. On about the fourth or fifth day these patients are started on mineral oil, 1 ounce daily. It has not been necessary to use a vent in the proximal loop in any of our cases. However, if distention is a troublesome factor, such a procedure may be used to advantage. The generally accepted rules of postoperative care, including early ambulation, are followed.

In our series of 75 cases of carcinoma of the colon operated on since 1938, 59 were operable, 16 inoperable, an operable rate of 78.6 per cent. A primary end to end anastomosis was done in 51 of these cases, with one death. A Mikulicz type of exteriorization was carried out in 8 cases with 2 deaths. Some type of operative procedure was carried out in 12 of the 16 inoperable cases. Two of these presented a perforation of the sigmoid at the site of the lesion and died of generalized peritonitis. In 6 inoperable cases a pre-colostomy was done. Thirteen of the 16 inoperable patients had lesions of the left side of the colon; 3 had lesions of the right side.

A number of our cases in this series were found to have liver metastasis. In those for whom we thought life could be prolonged and the patient made more comfortable, the operation was completed. Several of these patients have lived comfortably for a surprisingly long time. The rapidity of the growth cannot be determined at the time of operation, nor evaluated with any accuracy after it.

Certain advantages stand out in a series of cases of carcinoma of the colon operated on by the one stage anastomosis technic. The radical resection of the colon and growth is more completely done. The patient's stay in the hospital is much reduced, and this is obviously both a great economic advantage to the individual and a saving of bed space to the hospital. The mental state of these patients is also significantly improved by the one stage operation. Most important of all, as reported in the literature, the mortality of colon sur-

gery is decreased by the immediate end to end anastomosis operation for carcinoma.

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THE SIGNIFICANCE OF NIPPLE DISCHARGE

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THE primary purpose of this paper is an attempt to show the relationship between normal and abnormal discharges from the nipples of the mammary glands, to differentiate between them, and to define each.

The female breast is the most accessible organ in the body for examination. It is also the most difficult to diagnose. No other organ undergoes more histologic changes during health than does the female breast.

Normally it presents the greatest variety of sizes, shapes and contours of any organ in, on or about the body. It may be as small as a Georgia peach or as large as an Arkansas watermelon, and yet be normal in function.

It may contain secretion at birth, during the budding days of girlhood or during the sunset days of old age. Primarily its function is to secrete.

The secreting portion of the breast is made up of sixteen to twenty lobes consisting of acini and ducts. The acini are surrounded by fibrous tissue which fills in the interacinal spaces. The interlobular and interductal spaces are also filled in by fibrous tissue which is attached to the lobular capsule forming the ligaments of Cooper.

The infant breast contains all the elemental anatomic and histologic structures that the adult breast does. The epithelial cells lining the tubules and acini respond to stimulæ and cell activity begins the first or second week after birth. "During this period the ducts assume definite form. The tubules dilate and more or less complicated branching begins. In response to increased activity of the epithelium the surrounding connective tissue reacts, and the vessels dilate, producing an increase in volume or size of the entire breast." At this stage the breast may contain a milky fluid. "This state has been erroneously called 'Mastitis Neonatorum.' . . . It is not an inflammation at all but a response of the epithelium to stimulation of the mother's milk or to some hormone which stimulates the mother's breast to activity. . . .

At puberty the ducts and acini become more complicated. All the structures appear analogous to their condition in the first weeks after birth." . . . The breast at this stage . . . "measures approxi-

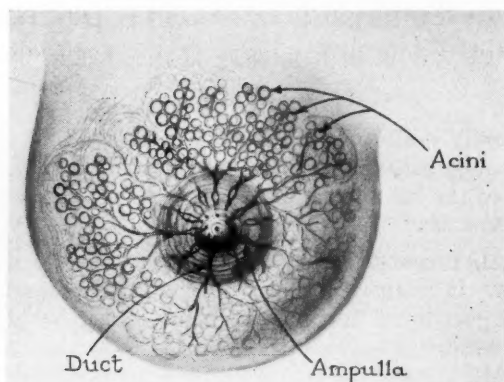


Fig. 1. Topography of the mammary gland showing acini and duct system of the gland. (Diagramatic)

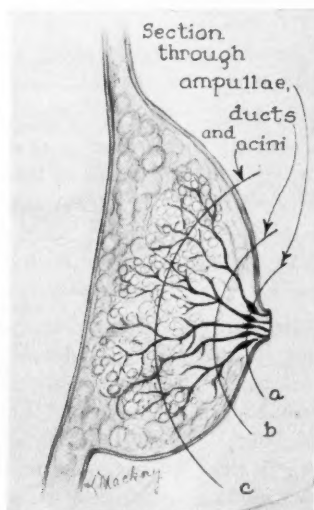


Fig. 2. Sagittal section through the mammary gland, showing acini and duct system of the gland. (Diagramatic)

mately 2 cm. in diameter." It may become enlarged, hard and firm, and may exude a milky fluid. This condition is called "Adolescent Mastitis." The term mastitis connotes inflammation of the mammary gland. This is no more an inflammation than an engorged lactating breast is an inflammatory process. The changes in the gland at this age are in response to hormone stimulation to the epithelial cells lining the tubules and acini, and are synchronous to changes taking place in the reproductive organs. The tubules begin

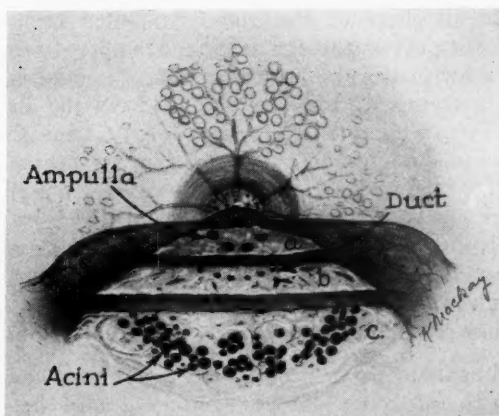


Fig. 3. Segmental sections of the mammary gland, showing transections through (a) Ampullae; (b) Ducts; (c) Acini. (Diagrammatic)

to elongate, increase in size, and the acini take on the adult characteristics. Fibrous tissue production is accentuated and fat globules begin to develop and fill in the intraductal spaces. The breast begins to enlarge and the nipple becomes more prominent and increased in size. From this stage on throughout adult life and even in old age the epithelial cells lining the tubules and acini are in a state of constant activity, proliferating, secreting and desquamating.

During pregnancy and lactation the breasts enlarge, due to increased activity of the cells. The acini become enlarged and secretion is increased in amount. As lactation progresses, the cells become larger, secretion increases, and in many women, exudes freely out of the nipples in large quantities.

During the so-called quiescent period, or the resting period of the breast, the epithelial cells are constantly active. Physiologically there is no such thing as a resting or quiescent period. Although the breast takes a vacation from milk production, epithelial cell activity continues. Most women who have borne children have a demonstrable amount of secretion which can be expressed from the nipples. In appearance this secretion may be greenish creamy or milky and sometimes brown or clear serous in character. There is present at all times varying amounts of secretion in the ducts which can be expressed from most nipples. The amount of this secretion varies according to the degree of cell activity. Its proper evaluation is difficult because of the variations in its character. If the anatomy, histology and physiology of a tubule with its different parts are kept in mind, it is less difficult to determine what is taking place in the secreting portion of the breast.

Briefly the histology of the gland is quoted from Hertzler's monograph, *Surgical Pathology of the Mammary Gland*.⁹ "The microscopic structure of the normal mammary gland is as variable as the gross anatomy. In the developing breasts the ducts only are supposed to form while the development of the acini is supposed to await the stimulus of pregnancy. This is by no means universally, even generally, true. Most normal breasts show a well developed acinal system which is particularly prominent during menstruation. The definitely outlined encapsulated lobules have been mistaken for incipient fibroadenomas. They represent only the unit lobule of the normal gland. In the early lactating breast these lobules are so large that they can be demonstrated by gross dissection.

"The fibrous tissue in the acinal lobules may vary in amount even in the young to a degree usually not observed until the involutional stage. This variation is found in all ages but is likely to be most prominent in menstruating breasts or during the early months of pregnancy. The epithelial cells appear to produce a sort of mucinous edema in the adjacent connective tissue. These changes in the connective tissue may be so much augmented that the fiber bundles appear thick and are very palely staining.

"The apparent relation between epithelium and connective tissue is much influenced by the stains used. If nuclear dyes alone are employed the acinal cells may appear dominant while if a specific connective tissue stain is used the fibrous tissue overshadows the epithelium. This fact is important because a hurried examination of a slide stained only with nuclear dye may give an erroneous impression of preponderance of epithelium.

"The acini, made up of glands and connective tissue present an ever varying picture of the relation of the cells and connective tissue. The one supplements the other. When the cells swell the connective tissue lessens in prominence. When the cells subside the connective tissue becomes more prominent. The connective tissue stains palely and may appear edematous when the epithelium is active. When the acini take on hypertrophy preparatory to lactation the connective tissue may all but disappear. When the epithelium reaches the resting stage the connective tissue reappears . . . an actual increase of connective tissue is of course sometimes observed. This may be associated with sexual excesses as well as with repeated pregnancies. In such cases the fibers seem thicker, stain palely, and seem hyaloid. . . .

"The structure of the ducts is worthy of special notice. The stratified epithelium of the skin covering the surface of the nipple extends down the ducts a short distance toward the ampullae where

the cells become columnar. As the lobules are approached they become cuboidal. The ducts are composed of two layers of epithelium, a superficial cuboidal or slightly columnar and a flat basal

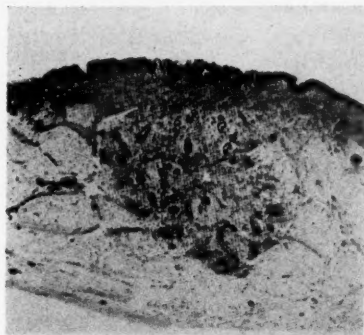


Fig. 4. Cross section of the mammary gland before birth. (Geschickter)

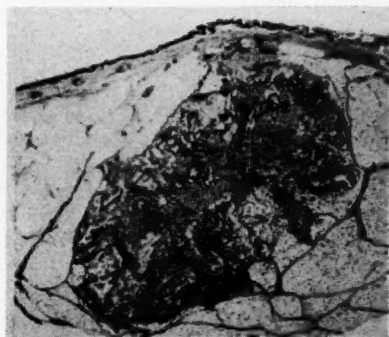


Fig. 5. Cross section of the mammary gland eight days postnatal. (Geschickter)

layer, the nature of which is not known. . . . These cells are prone to become vacuolated, and the periacinal connective tissue edematous, during menstruation and seem to lift up the epithelial layer. . . . In the terminal ducts the vacuolation may be well marked but the epithelial cells not dislodged." (The acini are lined by a single layer of cells.)

"The larger ducts, particularly at their termination in the nipple, are surrounded by a considerable layer of connective tissue. This layer is subject to variations so that the normal limits cannot be judged. The ducts, sometimes in the human, quite regularly in many of the lower animals, have fibrous tissue protrusions into their

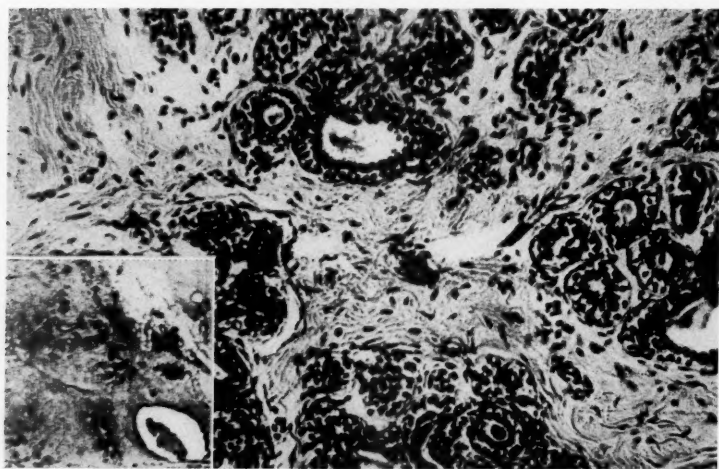


Fig. 6. Cross section of the mammary gland showing two layers of cells in the ducts. (Hertzler)

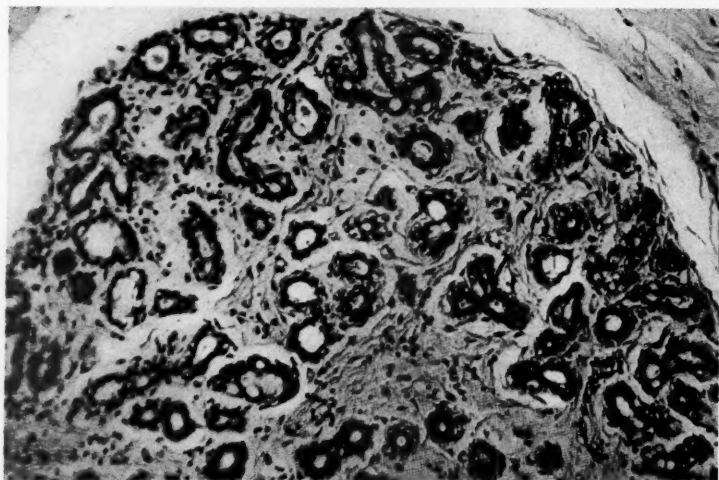


Fig. 7. Cross section of the mammary gland showing single layers of cells of acini. (Hertzler)

lumens suggesting the structure of the intracanalicular fibroadenomas.

"From the foregoing it is evident that a great variation of structure may be found in the normal breast. A realization of this truth earlier in the study of the diseases of the mammary gland would

have saved a great deal of misconception in evaluating the relation of structure to complaints."

During pregnancy and even menstruation there are histologic changes in the gland. The epithelium and fibrous tissue apparently

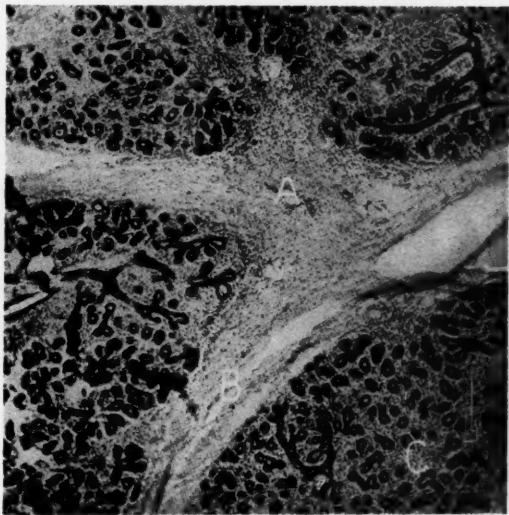


Fig. 8. Cross section of the mammary gland showing: (a) Interlobular connective tissue; (b) Perilobular connective tissue; (c) Periductal connective tissue. The fibrous tissue network is attached to the fascia surrounding the gland, forming the ligaments of Cooper. (Geschickter)

spar for dominance during these cycles. During pregnancy, lactation and even menstruation the glandular elements predominate, while during the interval between pregnancies and menstruation, and in the aged, the fibrous tissue elements appear to dominate the picture.

The anatomic unit of the mammary gland is the lobule including the ducts. The histologic unit is the epithelial cells lining the ducts and acini.

The primary purpose of the gland is to furnish nourishment to the young offspring, and therefore its primary function is to secrete. The breasts undergo cyclic changes analogous to the changes which take place in the endometrium during a menstrual cycle, and are probably due to the same hormones.

Under hormone stimulation the cells lining the acini and tubules are continually primed for an event which biologically is destined to take place not only in the uterine cavity but in the breast as well: pregnancy in the uterus and lactation in the breast.

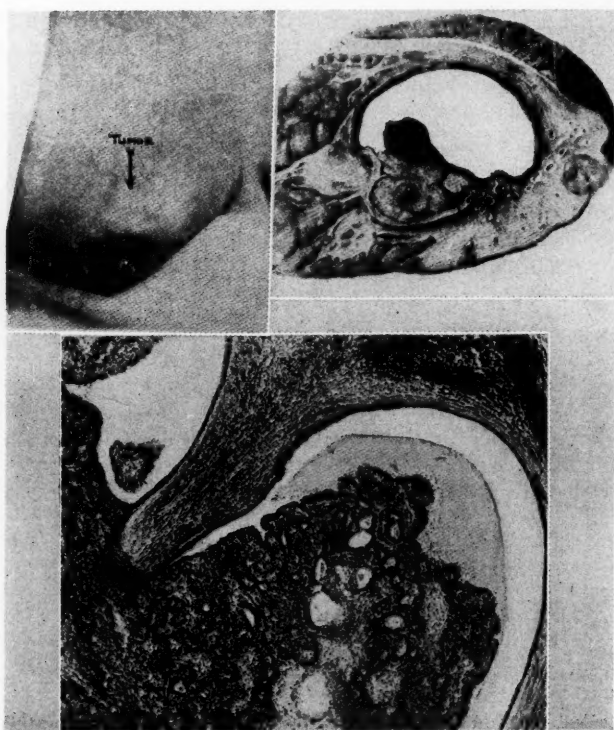


Fig. 9. Intracystic papilloma near the nipple. Upper picture shows the gross specimen. Lower picture shows the photomicrograph of the stalk of the papilloma. (Geschickter)

Geschickter⁵ says: "While the differentiation of the duct epithelium is primarily under estrogenic control, the hormonal control of lobular development is more complicated. The lobular buds proliferate during estrogenic stimulation; differentiate in response to the luteal hormones; and secretion in them is initiated by the lactogenic hormone of the anterior hypophysis. These changes in the mammary epithelium under stimulation presuppose adequate metabolism and nourishment. This adequacy is apparently lacking in hypophysectomized animals and those subjected to starvation."⁵

During the early part of the cycle, cell proliferation takes place, the acini increase in size and length. This corresponds to the proliferative phase in the endometrium. After ovulation the cells begin to secrete, like the endometrial cells during the secretory phase. In many breasts, during the secretory phase, there is some soreness and pain. The gland becomes distended and engorged, and in some the ducts appear more tortuous and nodular with tender and painful

points, thus presenting the clinical picture usually called chronic cystic mastitis. In some the ducts become plugged with desquamated cells and small cysts develop.



Fig. 10. Photomicrograph showing the structure of the papilloma. (Geschickter)

These clinical signs are seen often in the young as well as the more mature women, in the single as well as the married woman, in the nulliparous as well as the parous. Often it is more pronounced in the nulliparous, and may disappear with pregnancy and lactation. Nipple discharge under pressure is present in almost all of these breasts. The secretion in the nulliparous is thin mucoid, while in those who have borne children it is thick, creamy, or milky, or sometimes greenish in color. This condition could not justifiably be called a disease process. Functional change is probably a better term.

The dividing line between this condition and the so-called fibrocystic breast, cystic disease, adenosis, etc., is difficult to determine. The latter probably is a continuation or sequella of the first. In the first no definite nodules or cysts are palpable. In the latter either or both may be present. Nipple discharge, in the latter, may be no different from that in the first, except that it may be more profuse, particularly if there are retention cysts present. This is the type breast about which there is a great deal of controversy as

to treatment. Some recommend simple mastectomy, others recommend removal of the tumor, while others recommend palliative measures, such as hormone therapy and local applications, both of which are controversial procedures.

Nipple discharge may occur spontaneously or it may occur only when expressed from the ducts. It may consist of physiologic secretion or it may be pus, blood or bloody fluid and other necrotic material as a result of disease.

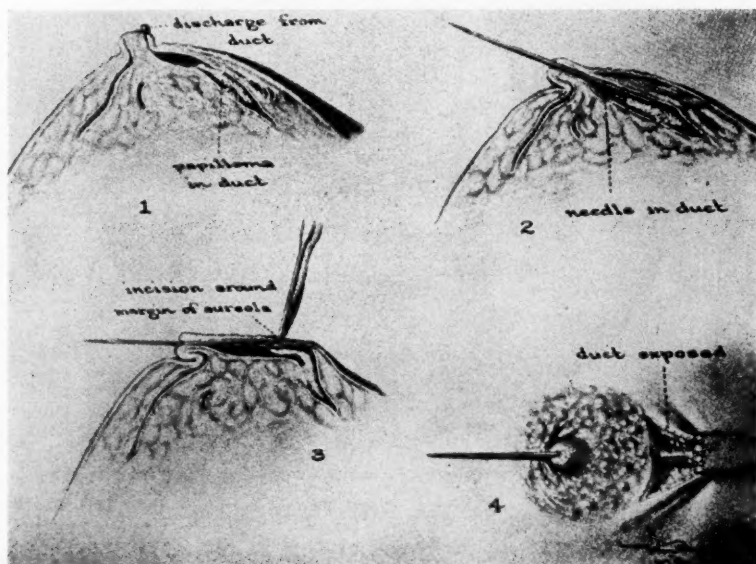


Fig. 11. Excision of papilloma containing mammary duct. 1. The origin of the duct is located by the exuding mucoid or bloody droplet. 2. The duct is dilated by the introduction of the blunt ends of ordinary sewing needles increasing size. 3. An incision along the areola border is made centering over the affected duct. 4. By tilting the outer end of the needle, the duct is raised and demonstrated in the wound. (Babcock, W. W., courtesy of Surgery.)

Physiologic secretion begins in the infant breast and is present throughout the greater part of life. The amount of secretion present varies according to physiologic changes which take place in the breast. The infant breast a few days after birth may contain visible quantities of secretion which can be expressed from the nipples. And again during adolescent changes there may be demonstrable quantities of secretion.

During pregnancy and lactation secretion occurs in large quantities which may appear spontaneously. Physiologic secretion, occurring in demonstrable quantities during these changes in the life

cycle of the individual, is due to the action of extra hormone stimulation, which is produced in increased amount by the changes which take place in the pituitary gland and the ovaries. That taking place in the breast of the infant is due to hormones in the mother's milk, lactogenic hormones, which act on the milk ducts in the infant breast.

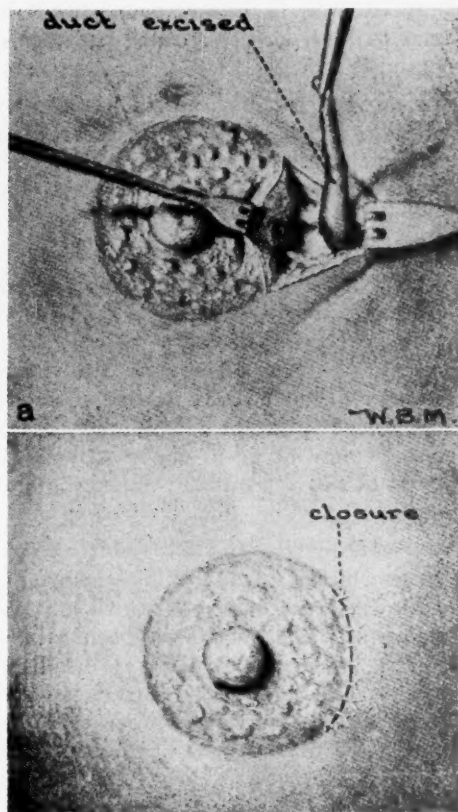


Fig. 12. (a) The papillomatous portion of the dilated duct is freely excised without ligation; and (b) the incision along the areola border is accurately united with fine dermal sutures. (Babcock, W. W., courtesy of *Surgery*.)

During adolescence, the pituitary gland may manufacture an extra supply of hormones to accommodate the demands placed upon it by the growing organism, and the epithelium of the acini and milk ducts are overstimulated, with the result that the breasts are engorged with an abundance of secretion. The same thing takes place during pregnancy and lactation. Not only is the estrogenic and luteum hormone increased, but the lactogenic hormones are pro-

duced; colostrum and milk occur in response to stimulation of the cells lining the acini in the milk ducts.

Postlactation secretion continues throughout the remainder of life in some women, in varying amounts in different individuals, or even in the same individual. It occurs in almost imperceptible amounts except occasionally there may be a demonstrable quantity which was retained in dilated ducts or small retention cysts.

During the so-called inactive or quiescent period of the breast—that is the years between infancy and adolescence and postmenopausal years—there is a certain amount of secretion in the tubules at all times, more during the adult years due to hormone activity. This justifies the paradoxical statement that “There is no such thing as a dry breast.”

Nipple discharge in the form of blood, bloody fluid or pus is not a secretory product, but a product of disease or trauma, and is therefore a pathologic discharge, as differentiated from the physiologic discharge which occurs in the form of milk, colostrum, a viscid or serous secretion. The former may occur in small or larger quantities either spontaneously or by manual pressure. The latter rarely occurs spontaneously except during pregnancy and lactation. Physiologic secretion may occur in abnormally large amounts in some breasts due to excessive hormone stimulation introduced from without or manufactured within due to speeding up of physiologic activity of the pituitary gland and the ovaries.

Nipple discharge which is bloody or blood-tinged is a most disturbing sign. The different conditions which may cause bleeding nipples, spontaneous or otherwise, have been catalogued as (a) Paget's disease, (b) Inflammatory disease (including syphilis, tuberculosis and other infections), (c) Intraductal papilloma, (d) Cancer, either carcinoma or sarcoma. There may be no palpable tumor present, or there may be small indefinite to large demonstrable tumors present. Here again there is no unanimity of opinion as to the proper method of treatment of this condition. Only when the cause of bleeding is definitely determined is the surgeon prepared to proceed with treatment, and even after this is done there is much disagreement as to the best procedure. For example, there are those who recommend simple to radical mastectomy for all bleeding nipples, particularly if a tumor can be palpated, while others recommend simple excision of the tumor for study before a final decision is reached. Dr. Babcock devised a method for diagnosis and treatment which is recommended.

According to statistical reports on the study of bleeding nipples there is a wide difference of opinion as to the incidence of malignancy.

nancy and benignancy found in breasts under this group. Even pathologists differ in their interpretation of slides made from section obtained either for biopsy or from the breasts after removal.

When surgeons disagree on what they feel and pathologists disagree on what they see, how is a correct diagnosis going to be made?

We are now studying a series of cases of apparently healthy breasts in women whose complaints are not related to their breasts. Of those studied thus far we find that more than 90 per cent have a discharge which can be milked from the nipples. It is possible that secretion could have been obtained from the other 10 per cent if we had persisted in our efforts.

The character of the discharge we have found is creamy to serous. Occasionally we find one in which the discharge is at first greenish creamy in character. In many of these breasts enlarged ducts either bilaterally or singly are palpated. We find that approximately 25 per cent of these women complain of some tenderness and pain just before they menstruate. Many of them unquestionably could be classed as having chronic cystic mastitis.

ILLUSTRATIVE CASES

CASE 1. Miss Mc., aged 24, virgin. Two years ago she had premenstrual pain and tenderness in the right breast. She took estrogen and was relieved. At present she has a palpable elongated mass 1 by $\frac{1}{2}$ cm. in the upper right aspect of the right breast. It is neither tender nor painful. A creamy serous secretion was expressed from both nipples. Microscopic study: no blood.

CASE 2. Mrs. P., aged 26, has three children. The youngest are twins, two years old. There are no complaints referable to her breasts. Examination: Her breasts are small but normally developed. There is no evidence of disease. A creamy secretion was expressed from both nipples. Microscopic study: fat globules, no blood.

CASE 3. Mrs. B., aged 36, nursed her last child 12 years ago. She has moderate premenstrual pain and soreness in both breasts. There are no palpable masses or nodules. A thick creamy secretion was expressed from both nipples. Microscopic study: fat globules and no blood.

CASE 4. Mrs. H., aged 41, nursed her last child 18 years ago. She has never complained of pain or soreness in her breasts. On July 8, 1949, she noticed a watery discharge from the left nipple which appeared spontaneously. Examination: She has large breasts, free from any palpable masses. A thick creamy discharge was expressed from the right nipple and a creamy serous discharge from the left nipple. Microscopic study: no blood from either nipple. A few plasma cells and occasional macrophages were seen in the secretion from the right nipple.

CASE 5. Mrs. A. passed the menopause at 42. She was never pregnant. There is no history of disease of the breast. Examination: Both breasts are free from disease. A serous secretion was expressed from the left nipple. Microscopic study: no blood.

CASE 6. Mrs. L., aged 44, has one child aged 22. She had a complete hysterectomy 16 years ago. She took theelin regularly for 4 years, then occasionally for 4 years. She took the last dose two months ago. She is nervous, particularly after intercourse. A large amount of secretion was expressed from both nipples. Microscopic study: fat globules, no blood.

CASE 7. Mrs. V., aged 35, has one child aged 3 years. Both breasts are apparently normal. Several large drops of dark green thick secretion was expressed from the right nipple. Microscopic study: fat globules present, no blood.

CASE 8. Mrs. C., aged 64, has three children. She complains of soreness in her right breast. Serous secretion was expressed from the right nipple. Microscopic study: fat globules, no blood.

FIGURE 13—CHART I

Frequency of nipple discharge found in the non-lactating and non-pregnant breast.

Garland	46%	Geschickter	3%
Greenbaum	70%	Our series	90%

The authors reporting did not distinguish between spontaneous discharge of the nipple and discharge expressed from the nipple. We made the distinction in our cases, and found that only approximately 4% belonged in the spontaneous non-pregnant and non-lactating group.

CASE 9. Mrs. N., aged 56, has two children. She has a mass in the right breast and red skin. A white creamy secretion was expressed from both nipples. Microscopic study: fat globules, no blood.

CASE 10. Mrs. C. W., colored, aged 30. She has a mass in her left breast. She has a bloody discharge from left nipple. Blood was expressed from the region of the mass; a white creamy secretion was expressed from another segment of same breast. A white creamy secretion was expressed from the right nipple. The pathologists reported the tumor was benign.

CASE 11. Mrs. A., aged 36, has five children. The youngest is 3 years old. The patient noticed a milky secretion from the left nipple the day of examination. Her breasts are free from any palpable masses. A creamy secretion was expressed from the left nipple and a serous secretion from the right. Laboratory reported no blood. Fat globules and a few epithelial cells were found.

CONCLUSIONS

Normal or physiologic discharge is a secretory product of the epithelial cells of the acini and milk ducts, and does not indicate disease.

Abnormal or pathologic discharge is not a secretory product of these cells. It may be blood escaping by way of the nipple as a result of trauma or disease, or it may be pus, the result of infection in the ducts or in the breast which is draining through the ducts.

It is possible to obtain both normal and abnormal discharge from the same breast. There may be a bleeding intraductal papilloma

from which blood can be expressed, or it may bleed spontaneously, and at the same time normal appearing secretion may be expressed from a healthy segment of the breast. This is possible even in the presence of a palpable tumor. Abnormal discharge must arise from abnormal or diseased tissue. To say that the secretion is abnormal it must be definitely determined that the source is diseased tissue, and that it contains blood, pathologic cells or necrotic material. To determine definitely the source of nipple discharge each terminal

FIGURE 14—CHART II

Classification of nipple discharge. (Physiologic.)

I Mucoid or Serous Secretion	II Thick, Creamy or Serous Secretion	III Colostrum, Milk
Found in small quantities only when expressed from the nipples of virgins, married women who have never lactated, and in the aged. No blood present. Fat globules may be present.	Found in large drops to droplets when expressed from nipples and ducts of women who have borne children. Fat globules present. Occasional epithelial cells seen.	Found in the breasts of pregnant and lactating women.

duct must be scrutinized for the presence of discharge, particularly during the process of milking the ducts. Each segment of the breast should be gently massaged towards the nipple. Discharge from a duct presents itself in the small pit, on the surface of the nipple, which is the location of the opening of a terminal duct. Several droplets may be present on the surface of the nipple, in which case several ducts have emptied some of their contents. This is one method of locating a bleeding intraductal papilloma, or an early carcinoma even before a tumor is palpable.

FIGURE 15—CHART III

Classification of nipple discharge (Pathologic)—

Creamy, Bloody, Watery or Purulent Discharge

Sometimes occurs spontaneously, but usually requires pressure over breast lesion.

Found in the breasts of women during the child bearing period and in the aged. Rarely ever in childhood.

I Benign Lesions	II Malignant Lesions	III Inflammatory or Infectious Lesions
1. Intraductal papilloma 2. Fibroadenoma 3. Cysts 4. Trauma	1. Carcinoma 2. Paget's Disease 3. Sarcoma	1. Mastitis 2. Infected ducts 3. Syphilis 4. T. B., etc.

An examination of the discharge is necessary to determine its nature. Only by microscopic or chemical study can the presence of blood, malignant cells, or pus, be determined. A smear should be made from each droplet as it appears on the nipple. Each breast should be studied, whether there is evidence of disease or not. Occasionally different kinds of secretion are obtained from the two breasts. Normal secretion may be found in one and abnormal discharge from the other.

We have not subjected the slides to cytologic study, although this may furnish the key to the significance of all nipple discharge in the not too far distant future.

FIGURE 16—CHART IV

Normal expectancy of cancer of the breast.

All women	.42%
Following Benign Breast Lesions	
1. Chronic cystic mastitis	.88%
2. Adenomas	2 %
3. Cystic disease	.79%
4. Intraductal papilloma	6 %
5. Mastodynia	None
6. Bloody discharge without palpable tumor	9 %
7. Bloody discharge with palpable tumor	33 to 44%

We have not developed a definite formula for the determination of a normal or abnormal discharge from the nipple. There are many factors which must be considered in an attempt to develop such a formula. We have a few known factors from which a beginning may be made.

SUMMARY

1. Nipple secretion containing no blood or pus in the absence of demonstrable disease has no clinical significance. If a palpable tumor is present, further study should be made.

2. Nipple discharge containing blood or bloody material, or purulent or watery discharge, is significant in diagnosing (a) Benign Lesions, (b) Malignant Lesions, (c) Inflammatory Lesions.

3. If no palpable tumor is present, a benign lesion should be suspected in more than 90 per cent of the cases.

4. If a palpable tumor is present, a carcinoma should be suspected in 33 to 44 per cent of the cases.

5. If the palpable mass is small and the discharge can be expressed from the mass, a benign lesion should be suspected—an intraductal papilloma, a fibroadenoma, a papillary cyst adenoma,

or a simple cyst. An early carcinoma can not be ruled out and should be kept in mind regardless of the size of the tumor or the nature of the discharge. Local excision is recommended for immediate microscopic study to determine the nature of the lesion and future treatment. If the lesion is benign, sufficient surgery has been done. If malignant cells are found, more surgery should be done, with or without x-ray therapy.

6. Nipple discharge may occur spontaneously or by manual pressure.

7. There are two types of discharge: (a) Physiologic secretion, (b) Pathologic discharge.

8. Nipple discharge should be subjected to microscopic and chemical study to determine its nature.

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THE SOUTHERN SURGEON, 1950

THE SOUTHERN SURGEON, now the official publication of The Southwestern Surgical Congress as well as of The Southeastern Surgical Congress, begins with this issue to publish papers from the new organization. The pages of THE SOUTHERN SURGEON will be devoted principally to papers read before the annual assemblies of the parent organizations, but other papers will be published from time to time at the discretion of the editors. Under the present plan the February and August issues will continue to be "University Numbers," the February, 1950, issue being devoted to the University of Louisville.

Regular readers of THE SOUTHERN SURGEON will have noted several changes in recent months: the new cover which appeared on the October issue, announcing the addition of The Southwestern Surgical Congress to the official family. *Abstracts from Current Literature*, which first appeared in the same issue, will be a regular feature, under the editorship of Dr. R. H. Stephenson. Dr. A. H. Letton will continue in charge of the *Book Review* section.

In the course of 1949, by the process of natural growth and with the addition of the members of The Southwestern Surgical Con-

gress, the circulation of the journal showed an increase of more than one hundred per cent.

At the beginning of 1949 *THE SOUTHERN SURGEON*, as it had since publication was resumed after the war, averaged 60 pages per issue, the University numbers being considerably larger. In April, the size was increased to about 80 pages per issue. In order to publish the papers from the Southwest, the average henceforth will be 100 pages, beginning with this, the January, 1950, issue.

NOTICE

THIS ISSUE

It will be noted that beginning with this, the January, 1950, issue of *THE SOUTHERN SURGEON* several changes have been made.

Due to the increase in the size of the journal and an increase in cost of paper and labor, the subscription price has been increased to \$8.00 in the United States and Canada, and \$9.00 in foreign countries.

The circulation of the journal shows an increase of more than one hundred per cent. For this reason advertising rates have been increased slightly more than sixty per cent. Only ethical advertising firms are invited to participate in advertising in *THE SOUTHERN SURGEON*.

B. T. BEASLEY, M.D.
Managing Editor

BOOK REVIEWS

The Editors of THE SOUTHERN SURGEON will at all times welcome new books in the field of surgery and will acknowledge their receipt in these pages. The editors do not, however, agree to review all books that have been submitted without solicitation.

THE SURGICAL TREATMENT OF FACIAL INJURIES. By VARAZTAD HOVANNES KAZANJIAN, M.D., D.M.D., and JOHN MARQUIS CONVERSE, M.D. Price, \$10.00. 574 pages. Baltimore, Maryland: The Williams & Wilkins Co., 1949.

Here is a book based on the personal experience of the authors, dealing with facial injuries in many thousands of patients including casualties of the two great wars. The text covers every aspect of treatment of all types of trauma of the face. The purpose of the book is to stress the authors' viewpoint with respect to the surgical treatment of facial injuries, and therefore is limited to cases of their own personal experience. No attempt is made to claim originality in the operative procedures described.

The first three chapters deal with a brief survey of the evolution of the human face, some aspects of anatomy, the healing of wounds, the general principles of operative technic. The following chapters deal with fractures of the bones of the face and jaw, while later the text is devoted to the general principles of reconstructive surgery. Deformities of the upper portion of the face, eyelids, orbital regions, nose, and soft tissues and bones of the lower portion of the face are discussed. There are also chapters dealing with the oral cavity and pharynx, temporomandibular ankylosis, facial paralysis, deformities of the external ear and burns of the face. The text is concluded with a chapter on maxillofacial prosthesis and a chapter on anesthetic management of this type case.

The photographs are very good and the reproduction is near perfect. The drawings are all of the pen and ink type and of the simplest form, making them easily understandable and demonstrating each condition or procedure in a very good manner.

The authors feel that the book should be of interest not only to the plastic surgeon, but also to the general practitioner in fields of medicine and dentistry who may be called upon to render emergency treatment of facial injuries. The otolaryngologist, the ophthalmologist, neurosurgeon and orosurgeon, they feel should find sections of special interest. We feel, however, that the greatest interest in the book should be shown by the plastic surgeon; while it would be well for the general surgeon to have this knowledge at his beck and call, he would probably find little use for the book unless he is peculiarly situated in his practice. We feel that the book is excellently done, each chapter is taken in an orderly manner and each procedure is given in detail. Likewise, each procedure is quite adequately illustrated. The authors have done a very good job throughout.

A. H. L.

ILLUSTRATIONS OF SURGICAL TREATMENT—INSTRUMENTS AND APPLIANCES. By ERIC L. FARQUHARSON, M.D.—Edinburgh—Third Edition. Price, \$7.00. 391 pages. Baltimore: The Williams & Wilkins Co., 1949.

There is a foreword by Sir John Frazier in which he praises the author for his originality in many of the procedures described later in the book. The book

deals mainly with orthopedic problems; the first two chapters deal with infusion and transfusion, while the next three parts deal entirely with fractures, dislocations and diseases of the bones and joints. The appendix, which covers some 130 pages, is merely a catalog of instruments used not only by the orthopedic surgeon, but by the general surgeon and some of the surgical specialists. One page shows a drawing of the instrument and on the opposite sheet there is a description of the instrument. This seems a waste of good textbook pages in that these same things can be easily obtained from a surgical catalog, which would also include the price of the article.

The written matter is quite nicely done, the descriptions being clear and concise. The illustrations are rather typical of the British Isles, while the drawings are not too artistic, they do get over their point. The photographs are well reproduced.

It is felt that this book would find use by the industrial surgeon, as well as by the general surgeon who is doing orthopedics. It is a shame the later portion of the book has been devoted to instrument cataloging.

A. H. L.

HANDBOOK OF SURGICAL UROLOGY FOR INTERNES, HOSPITAL CORPSMEN, AND NURSES. By NELSE F. OCKERBLAD, M.D. Price, \$3.00. 189 pages. Baltimore: The Williams & Wilkins Company, 1949.

Dr. Ockerblad is a recognized authority in his field and is well qualified to present his treatise. It is properly titled a handbook, for it is a brief but surprisingly comprehensive book. The terminology is simple, and the reader is spared the toil of too much detail, for the book is designed primarily for the aid of urologic assistants—internes, hospital corpsmen, and nurses. Actually it appears also to be valuable for medical students, not as a textbook or reference, but as an introduction to the course in urology. It is so short and simple that it can be read completely in several hours. It is extremely readable for a scientific book, and a chapter on the history of urology is quite fascinating. Although not suitable for the training of urologic residents, this book is recommended as a desirable reference for convenient use by nurses and hospital corpsmen who are attached to urologic services. It is not a book of detailed technic and procedure but one of fundamental fact and principle for the urologic assistant.

W. E. G.

A SHORT PRACTICE OF SURGERY. By HAMILTON BAILEY and R. J. McNEILL LOVE. Eighth Edition. Price, \$10.00. 1050 pages, with 1098 illustrations with 280 in Color. Baltimore: The Williams & Wilkins Co., 1949.

The text is of peculiar size, the pages measuring roughly 6 by 8½ inches. The printing is easily readable, the illustrations are multiple, many of them being in color which is quite good. The full line of conditions are treated in a rather brief manner; only the bare essentials are mentioned. There is lacking an explanation for many of the statements that are made, only a few statistics are given and many conditions are merely mentioned without any type of treatment being suggested. The work seems to be fairly well up-to-date, as one would expect from such men as Mr. Hamilton Bailey and Mr. R. J. McNeill Love. The illustrations are frequent, and are one of the better features of the book. The text, as a whole, seems to be more of an encyclopedia of surgical disease in which only a minor amount of treatment is discussed. Strangely enough, we find directions for measurements in ordering a truss outlined in

detail, a procedure rarely mentioned in other surgical texts. The book is written in chapters dealing with the anatomic division of the body, rather than physiologic or by systems. There is included a glossary as well as a detailed index.

This book should be of interest to the practitioner who wants a short practice of surgery, one where the disease is discussed but briefly and would be of more use as reference than as reading material because of the lack of explanation and description of operative technics. The book is a goldmine of information and should find a place on a library shelf of most surgeons as well as medical men.

A. H. L.

ABSTRACTS FROM CURRENT LITERATURE

THE PATHOGENESIS OF HYPERTHYROIDISM. P. Heinbecker, *Ann. Surg.* 130:804-825 (Oct.) 1949.

The release of the excess of the hormone normally produced by the acinar cells of the thyroid gland may be due to an abnormality of a localized group of cells in the thyroid gland (as in an adenoma) or it may result from a generalized overaction of the cells of the thyroid gland by overstimulation with thyrotropic hormone. In a previous communication the author has demonstrated that the source of this thyrotropic substance is produced by the basophile cells of the hypophysis. From experimental and clinical data, the author presents evidence that the hypophysis is subject to depression and activation by the central nervous system by way of the exteroceptive and interoceptive impulses which reach it by way of the hypothalamus. Different individuals differ in their degree of response to this reaction. Hyperthyroidism caused by increased activity of the normal secretory cells of the thyroid gland occurs in persons so constituted that their adaptation responses to the sum of their external and internal body stimuli is excitation for the supraoptic and paraventricular nuclei of the hypothalamus which in turn acts upon the hypophysis through demonstrated pathways.

Depression of the thyroid gland, the ovarian follicles and the seminal vesicles also increase the maturation of the basophile cells through a decrease in the normal inhibitory influence of secretions of these structures on such maturation. The higher incidence of hyperthyroidism in women because increased estrogenic secretion favors the secretion of the neural hypophysis.

Exophthalmus is due to swelling of orbital contents and before chronicity is established, it is reversible. The swelling is a result of the water retaining influences of the secretions of the neural hypophysis, particularly of the thyrotropic hormone. A depression of the thyroid hormone has a similar influence. A local susceptibility of the orbital tissues to the water holding influence must be assumed. The lymphoid accumulation in the orbital tissues is due to a depression of the adrenal cortical function as a part of general endocrine imbalance tending to hyperthyroidism.

Since the secretory production of the basophile cells is inhibitory to the parathyroid gland and the basophilic cells are in turn inhibited by an excess of parathormone, removal of an actively secreting parathyroid tumor may result in hyperthyroidism by permitting overactivity of the basophilic cells.

THE CAUSE OF DEATH IN STRANGULATION OBSTRUCTION: AN EXPERIMENTAL STUDY. P. Nemir, Jr.; H. R. Hawthorne; I. COHN, JR., and D. B. DRABKIN, *Ann. Surg.* 130:857-873 (Nov.) 1949.

Though the mortality in acute intestinal obstruction has decreased from about 60 per cent to about 10 or 20 per cent in the last fifty years, the decrease has been chiefly manifested in the non-strangulated cases. This report covers some of the investigation which the authors have conducted in an attempt to clarify further the cause of death in these strangulation cases.

In carefully selected vaccinated dewormed adult mongrel dogs operated under pentothal anesthesia, the entire omentum was resected to eliminate this possible source of revascularization and the bowel transected at a standard dis-

tance below the ligament of Treitz. A segment of the proximal loop was strangulated by means of ligatures. A tube was threaded through the normal bowel into the strangulated segment. Seven animals were so treated. Six of the seven responded in a similar manner and died with an average survival of 36 hours. One of the six animals demonstrated a volvulus at autopsy involving a segment of bowel distal to the one purposely strangulated. The seventh animal lived for 75 hours at which time resection of the strangulated segment was performed.

Postoperatively, the animals remained in relatively good condition up to four to one hours prior to death. Death occurred suddenly and was preceded by convulsive seizures.

A study of the gut contents and peritoneal fluid revealed a constant sequence of events. At around twelve hours postoperatively, the fluid changed character, was black in color and had a foul odor. From this point on, the fluid did not change.

In these animals, adequate fluid replacement was given to exclude the possibility of death from shock due to fluid loss. The death of the animals followed the appearance of the dark foul peritoneal fluid. By spectrophotometric analysis, it was demonstrated that the character of this fluid is due in part to the presence of a hemoglobin derivative hitherto unreported in vivo. It would appear that a lethal agent is present in this fluid and its reabsorption into the blood stream is responsible for the death of the animal. If this be true, injection of this fluid into the blood stream should demonstrate its toxicity. This phase of the problem will be covered in the following report.

Part II: The Toxicity of the Peritoneal Fluid, pp. 874-880.

By injecting the fluids collected at various times after operation into normal unanesthetized dogs, the investigators were able to determine that the pink or strawberry colored fluid which owes its character to the presence of blood and unchanged hemoglobin is nontoxic by either the intravenous or the intraperitoneal route. The late or black peritoneal fluid which has been shown to be derived in part from the luminal contents is lethal when injected by either the intraperitoneal or the intravenous route. The toxicity is proportional to the contents of the unidentified pigment but no evidence is at hand as yet to identify the pigment itself as the toxic agent.

THE CLINICAL USE OF POLYETHYLENE TUBING FOR INTRAVENOUS THERAPY. A Report on 72 Cases. B. J. Duffy, Jr., *Ann. Surg.* 130:929-936 (Nov.) 1949.

In 72 postoperative patients on the surgical service at Memorial Hospital in New York in whom intravenous therapy was difficult due to previous insult of the veins, etc., the author has employed polyethylene tubing inserted into the vein through needles and left continuously in place for intermittent intravenous therapy. A close record was kept indicating length of time the tubing was left in place, type of solution given and complications.

Two different calibers of tubing were used. These were inserted through thin walled No. 14 or No. 17 BD needles. The tubing was sterilized by boiling in glass tubes (it does not withstand autoclaving) and is stored in 1:1000 aqueous solution of zephiran. The needle is inserted on a syringe which contains 1 c.c. of heparin, a small amount of which is injected as soon as the

needle enters the vein. The tube is passed through the needle after a small amount of heparin is injected into the tubing. With digital pressure, the tubing is held in the vein while the needle is withdrawn. A small amount of heparin is then injected through the needle and it is either immediately employed or plugged for subsequent use.

The arm veins were found to present limitations largely due to irritation produced through mobility of the extremity. The external jugular and the femoral were found to be preferable. The femoral is never used in laparotomy cases, etc., for fear of adding to the threat of thrombosis.

Pure polyvinyl and polyethylene plastics are well tolerated by the tissues. Previous reactions and fibrous tissue production has been determined to be due to the fact that plastics which are dissolved in various solvents for purposes of shaping are not pure. The tubes employed have been fashioned by the extrusion method from the pure melted plastic.

Ten local reactions including three frank thromboses were encountered in 18 patients whose arm veins were used. Six minor reactions occurred in 43 patients in whom the jugular or femoral veins were employed. In one case the tubing was maintained in position for 39 days and in another for 35 days. Further modifications of the technic including the use of a smaller tubing for the peripheral veins is indicated.

THE USE OF FREE PERITONEAL GRAFTS IN INTESTINAL ANASTOMOSES.

S. T. Chester; H. G. Bell, and H. J. McCorkle, *Surg., Gynec. & Obst.* 89:605-608 (Nov.) 1949.

When Devine first employed free peritoneal grafts for sealing anastomotic suture lines experimentally in 1946, the grafts were fixed in position by the thrombin clot technic. Using a modification in which the grafts were fixed in position by means of fine cotton sutures, the authors employed this method in sixteen dogs. The peritoneal graft (sometimes including the thin fascia of the posterior rectus sheath) was taken from the margin of the laparotomy wound. The divided colon was anastomosed end to end by means of interrupted cotton sutures. The anastomotic site was treated with serum and the peritoneal side of the graft with thrombin. The graft was placed in position and fixed in place with interrupted fine cotton sutures.

None of these animals died and none had evidence of peritonitis despite the obviously inadequate anastomosis. Grafts were examined at varying intervals from 3 to 120 days postoperatively. Adhesions were found in 90 per cent of the animals in the first two weeks and in 40 per cent after six weeks. The grafts all remained viable and adherent. The grafts caused no constriction at the site of anastomosis.

CONGENITAL PYLORIC STENOSIS IN BINOVULAR TWINS. E. S. R. Hughes; H. A. D. Small, and J. W. F. Macky, *Brit. M. J.* (Oct. 1) 1949.

Though it is unusual for siblings to be affected with this congenital anomaly and rare for two or more generations to be involved, the authors in their search of the literature have discovered several instances in which the anomaly has occurred in dissimilar twins. The anomaly usually does affect each twin of monozygotic origin but exceptions have been recorded.

Case reports are presented of dissimilar twins, born to a 33 year old para-2 mother, both with typical pyloric muscle tumors and both successfully treated with Rammstedt's operation.

This occurrence adds to the rapidly accumulating evidence that this anomaly has definite hereditary tendency with Mendelian recessive characteristics.

EXPERIMENTAL ASCITES. F. W. McKee; J. A. Schilling; G. H. Tishkoff, and R. E. Hyatt, *Surg., Gynec. & Obst.* 89:529-540 (Nov.) 1949.

Though constriction of the portal vein or the inferior vena cava below the liver fails to produce ascites, it may be produced experimentally by constriction of the inferior vena cava in the chest. This has been accomplished by various means. The authors' method has been to employ an aluminum band applied around the inferior vena cava constricting its lumen by about 50 per cent. The operative procedure used is described in detail.

Two normal healthy dogs were so treated and the observations on these animals provide the basis for this report. Various combinations of protein and sodium intake were applied and the daily accumulations of ascitic fluid and its protein content were carefully observed. The marked increase in ascitic fluid which occurred with increase in sodium intake both with high protein and low protein diets was particularly striking as was the increase in ascitic fluid produced by the intravenous administration of plasma. Minimal amounts of ascitic protein loss occurred with high protein and low sodium intake. One animal was kept free of ascitic accumulations for prolonged periods by use of a high protein diet with attention to the sodium intake.

Administration of large amounts of a sodium free seasoning agent in capsules had no effect on ascites.

The authors feel that their findings add to the rapidly accumulating evidence that Starling's original hypothesis (that production of ascites depended solely upon the level of the plasma albumin) is to be seriously questioned. The actual source of the ascitic fluid is suggested to be from the congested liver by way of transudation through the capsule from the subcapsular lymphatics.

AN EVALUATION OF OXYGEN THERAPY. P. B. Price; R. C. Richards, and J. B. Hammond, *Ann. Surg.* 130:747-753 (Oct.) 1949.

Though the theoretic limitations of the benefits of oxygen therapy have been previously defined, it has been used widely as a therapeutic agent in situations where its indications are uncertain. Goodman and Gilman in their textbook have stated that "with few exceptions, the therapeutic usefulness of oxygen is in anoxic anoxia." It has been commonly assumed that when oxygen is administered to a patient his total oxygen consumption is increased. Doubting the validity of this assumption, the authors have measured the oxygen uptake in narcotized dogs. Three groups were studied. In the first group, shock was induced in various ways. In the second, central circulatory failure was produced by cardiac tamponade. In the third group, respiration was embarrassed in various ways.

In experimentally produced shock, administration of 100 per cent oxygen did not result in either clinical improvement or increased oxygen consumption. Likewise in central circulatory failure produced by tamponade, it could not

be demonstrated that breathing oxygen had any advantage over breathing atmospheric air. However, when respiration was definitely embarrassed by central depression, tracheal obstruction, prolonged inspiratory resistance, pneumothorax or constriction of the chest or abdomen, the animals showed clinical improvement and the total oxygen uptake was increased. It was noted that the relief of dyspnea was associated with a fall in blood pressure of 20 to 40 mm. of mercury. This led the authors to conclude that administration of oxygen might be contraindicated when hypotension and dyspnea coexist. Further remarks on the clinical implications of these experimental observations are presented.

THE CIRCULATION OF THE SMALL INTESTINE: AN EVALUATION OF ITS REVASCULARIZING POTENTIAL. R. J. Noer; J. W. Derr, and C. G. Johnston, *Ann. Surg.* 130:608-621 (Oct.) 1949.

In an effort to clarify some of the confusion and contradiction in the literature concerning the circulation of the jejunum and ileum, the authors have conducted over a period of a number of years rather extensive investigation into this question. The various technics of investigation and experimentation in bowel circulation are discussed. In this study several investigative technics were used. The results of morphologic studies of 5 human autopsy specimens and upon 29 specimens of 14 species of animals were reported in 1943. This investigation has been broadened until the present report is based upon observation of 34 human autopsy specimens, 9 dogs, 5 rabbits and 26 other animals. Injection technics have formed the basis for the morphologic studies. The celloidin injection and erosion technics have been abandoned in favor of clearing technics. Mesenteric occlusion technics in animals were used for revascularization studies. Further studies were carried out with injection of india ink in bovine plasma studied by slow motion cinephotography.

The "Roux-Y" loop was employed for studies of the degree of mobility possible. This was used in two different groups with variation. In the first group of animals the free end of the Roux loop was closed as a blind segment. In the second group, the loop was anastomosed with the distal segment for purposes of decompression. In the first group (7 dogs) 6 died and one survived after an extremely stormy course. In the second group, 6 of 7 survived. This effect of adequate decompression might have been predicted but the authors did not suspect that it would effect such a tremendous difference in survival rate. This led them to conclude enteroenterostomy at the base of extension loops is of utmost importance. Their studies are also indicative that double loops have a much greater chance of success since collateral circulation is brought into play from both ends of the loop.

The morphologic studies indicate that the choice of species of animals for investigative work in regard to intestinal obstruction, etc., is of great importance. Their findings would indicate that the circulation patterns of the small bowel of the opossum and the rabbit more nearly resembles that in man than does that of the more commonly used dog.

The light that is cast upon the intramural collateral circulation of the small bowel would indicate that this is rather more efficient than has been previously supposed. This should not in any case alter the present principles of anastomosis which concerns itself with preservation of all the blood supply possible but will perhaps be a source of reassurance when for some reason the blood supply

of the anastomosed segments is somewhat less than ideal. The deleterious effects of distention upon the efficient performance of the intramural collateral supply cannot be overemphasized.

POSTOPERATIVE NITROGEN LOSS. S. C. Werner; D. V. Hibif; H. T. Randall, and J. S. Lockwood, *Ann. Surg.* 130:688-702 (Oct.) 1949.

The marked deviation from normal habits of nutrition and activity which an individual undergoes following operation or injury must be carefully evaluated before the effect of the trauma per se can be determined. The results obtained by the authors in this study conducted in the surgical metabolism unit at the Presbyterian Hospital in New York would seem to require a revision of some previously accepted hypotheses. The "toxic destruction of protein" postulated by various workers shortly after the turn of the century has given way to the theory of the "alarm" response by activation of the adrenal cortex. Using adrenalectomized rats given constant amounts of corticoadrenal hormones, previous workers have shown that the function of the adrenal is to permit the body to react adequately to its needs following trauma. Later, other workers found that nitrogen loss could be prevented by increased food intake.

In the present study, the authors have made careful observation of 26 patients for periods preceding surgery as well as following surgery. Thus each patient served as his own control. All patients were in a state of good health and nutrition. There were 10 men and 16 women. Their ages ranged from 18 to 67 years. Eleven patients underwent cholecystectomy, six ventral herniorrhaphy, eight inguinal herniorrhaphy (one bilateral) and one patient had a polyp removed from the colon by colotomy. The patients were carefully studied during periods of adequate nutrition, substandard caloric intake and again adequate nutrition before operation. Variations were conducted, giving diets parenterally as well as by mouth. One group was given a base line diet steadily before and after operation.

The authors conclude that no significant increase in nitrogen output resulted from the operative procedure and that simple caloric lack explains the postoperative nitrogen loss found following operation uncomplicated by infection. In discussion the question was raised whether more extensive trauma would have the same negative effect. Further study will be needed to answer this question but it seems reasonable to presume that the findings here would not change with more extensive procedures. In more extensive degrees of trauma, however, fever would be likely to complicate the picture and increased caloric requirement for metabolism at the higher temperature would have to be taken into consideration.

MARJOLIN'S ULCER. D. M. Glover and C. L. Keihn, *Am. J. Surg.* 78:772-780 (Nov.) 1949.

The occurrence of malignant ulcer in cutaneous scars was first described by Marjolin in 1828. These malignancies, which are almost invariably squamous cell carcinomata, occur in scars of various origin but most frequently in burn scars. The malignancies developing in scars resulting from radiation burns are not usually classed as Marjolin ulcers but the mechanism of production is similar. Both depend upon the cycle of repeated ulceration and healing

in a dense, relatively avascular collagenous cicatrix covered by thin, unstable epidermis.

Untreated, the disease will eventually result in the death of the patient, but remote metastases are slow to appear. This slow progress of the ulcer renders it amenable to treatment by radical surgical excision and skin graft plus regional node resection when the nodes are involved. The condition must be suspected when gross induration of the margin and irregularity of the base is noted in an ulcer in an old scar.

Seven cases are reported, five of which occurred in burn scars of twenty to fifty years' duration. Lymph nodes were involved in the cases which were fatal. In none of the cases had skin graft been employed originally. It is apparently possible to prevent these lesions by proper replacement of skin even many years after the original injury. This may be done by pedicle grafts, free grafts or Z-plastics. Roentgen irradiation of contracted scars which tend to break down is futile and dangerous as is illustrated by a case report. The authors conclude that Marjolin's ulcer is always preventable by appropriate transplantation of skin for closure of open wounds and by replacement of dense scars before they break down.

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 DR. G. G. ALTMAN.....908 Brown Bldg., Louisville
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DR. LANIER LUKINS.....	656 Francis Bldg., Louisville
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DR. C. J. SCURRY.....	431 Main St., Greenwood
DR. S. B. SHERARD.....	Gaffney
DR. KEITH H. SMITH.....	201 E. North St., Greenville

DR. LEWIS H. TAYLOR, JR.	300 S. Main St., Greenville
DR. L. P. THACKSTON	47 Carolina Ave., Orangeburg
DR. W. P. TURNER	310 Maxwell Ave., Greenwood
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DR. J. WARREN WHITE	206 E. North St., Greenville
DR. DAVID A. WILSON	209 E. Coffee St., Greenville
DR. JAMES M. WILSON	145 Rutledge Ave., Charleston
DR. CHARLES N. WYATT	301 E. Coffee St., Greenville
DR. J. R. YOUNG	126 E. Earle St., Anderson

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DR. RALPH B. SCURRY	Scurry Clinic, Greenwood
DR. JAMES H. YOUNG	25 Thomas Rd., Wellesley, Mass.

TENNESSEE

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DR. WILLIAM M. ADAMS	902 Madison Ave., Memphis
DR. CHESTER D. ALLEN	1019 Madison Ave., Memphis
DR. J. SUMPTER ANDERSON	Bennie Dillon Bldg., Nashville
DR. CHARLES G. ANDREWS	899 Madison Ave., Memphis
DR. J. MALCOLM ASTE	265 South Bellevue, Memphis
DR. TROY P. BAGWELL	807 Medical Arts Bldg., Knoxville
DR. ROBERT H. BAKER	609 West Main Ave., Knoxville
DR. SIDNEY W. BALLARD	Bennie Dillon Bldg., Nashville
DR. L. D. BENNETT	Doctors Bldg., Nashville
DR. JAMES D. BILES, JR.	899 Madison Ave., Memphis
DR. WILLIAM T. BLACK, JR.	899 Madison Ave., Memphis
DR. ROBERT FORREST BONNER	1000 Madison Ave., Memphis
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DR. JAMES M. BROCKMAN	188 S. Bellevue, Memphis
DR. GEORGE H. BURKLE	39 South Cleveland, Memphis
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DR. JOHN H. CHANDLER	420 E. Main St., Jackson
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DR. EDWARD S. CLAYTON	607 W. Main Ave., Knoxville
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DR. R. M. DeHART.....	212 6th St., Radford
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DR. CHARLES R. DUNCAN.....	8th and Randolph St., Radford
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DR. J. MOREHEAD EMMETT.....	C & O Hospital, Clifton Forge
DR. CARSON L. FIFER.....	114 N. Washington St., Alexandria
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DR. BRYANT E. HARRELL.....	142 West York St., Norfolk
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DR. ROBERT P. HAWKINS, JR.....	The C. & O. Hospital, Clifton Forge
DR. WILLIAM B. HOOVER.....	1204 Colonial Ave., Norfolk
DR. FRANK S. JOHNS.....	Johnston-Willis Hospital, Richmond
DR. WILLIAM A. JOHNS.....	Johnston-Willis Hospital, Richmond
DR. MARCELLUS A. JOHNSON, JR.....	Lewis-Gale Hospital, Roanoke
DR. LINWOOD D. KEYSER.....	909 Medical Arts Bldg., Roanoke
DR. JOHN R. KIGHT.....	1204 Colonial Ave., Norfolk
DR. GERSHON J. LEVIN.....	600 Wainwright Bldg., Norfolk
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DR. J. ROBERT MASSIE, JR.....	1000 W. Grace St., Richmond
DR. ROBERT MATTHEWS.....	215 Medical Arts Bldg., Norfolk
DR. LOUIS A. McALPINE.....	505 Washington St., Portsmouth
DR. JOHN M. MEREDITH.....	1200 E. Broad St., Richmond
DR. RICHARD A. MICHAUX.....	Stuart Circle Hospital, Richmond
DR. JAMES A. MILLER.....	114 W. Boscawen St., Winchester
DR. CHARLES M. NELSON.....	409 Medical Arts Bldg., Richmond
DR. RICHARD B. NICHOLLS.....	605 Medical Arts Bldg., Norfolk
DR. BERNARD L. PARRISH.....	804 Wainwright Bldg., Norfolk
DR. WAVERLY R. PAYNE.....	91 29th St., Newport News
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DR. CHESTER L. RILEY.....	212 W. Boscawen St., Winchester
DR. NATHANIEL F. RODMAN.....	316 Medical Arts Bldg., Norfolk
DR. HERBERT W. ROGERS.....	812 Medical Arts Bldg., Norfolk
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JUNIOR FELLOW

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